NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

September, 1934

THE TYLER NIAGARA SCREEN

The Niagara is the recognized leader among high speed mechanically vibrated screens. It was the first in its field and has held its position by sound design and successful performance.

The W. S. Tyler Company is pleased to offer this screen to the trade under the name of TYLER-NIAGARA.

Inquiries and orders for machines, screen cloth and repair parts should be sent to the General Offices, Cleveland, Ohio.

The Tyler-Niagara Screen is protected by U. S. and Foreign patents issued and pending.

THE W. S. TYLER COMPANY
Cleveland, Ohio

Manufacturers of Woven Wire Screen • Screening and Drying Equipment

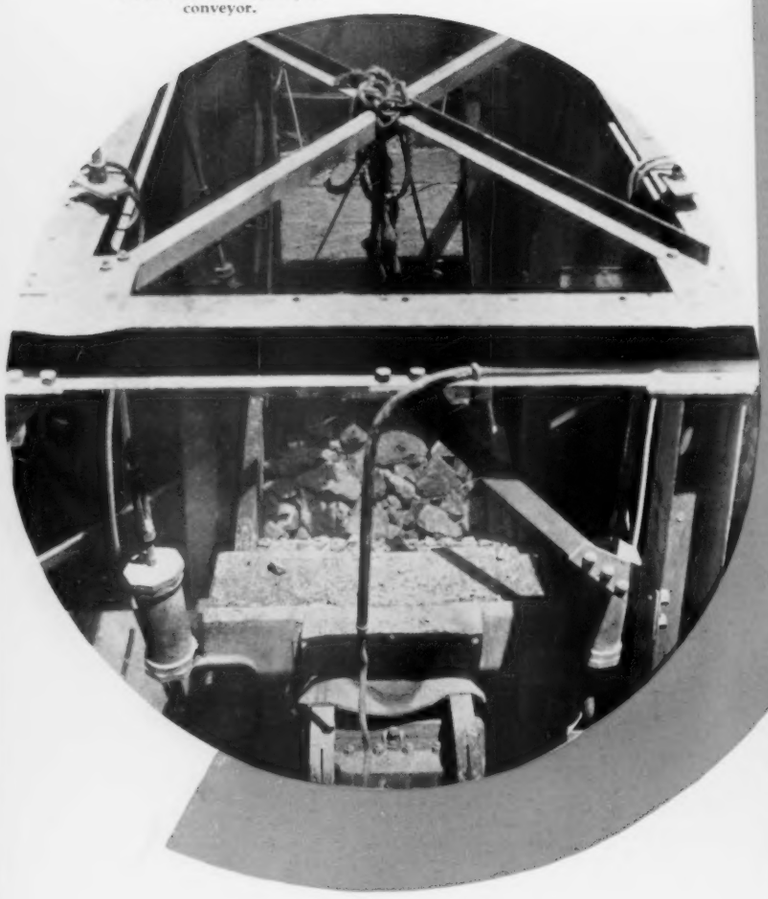
★ Pages 19-27

SCREEN

JEFFREY

SETS THE PACE AT T.V.A.

This primary Jeffrey-Traylor feeder receives output of crusher and distributes feed uniformly to conveyor.



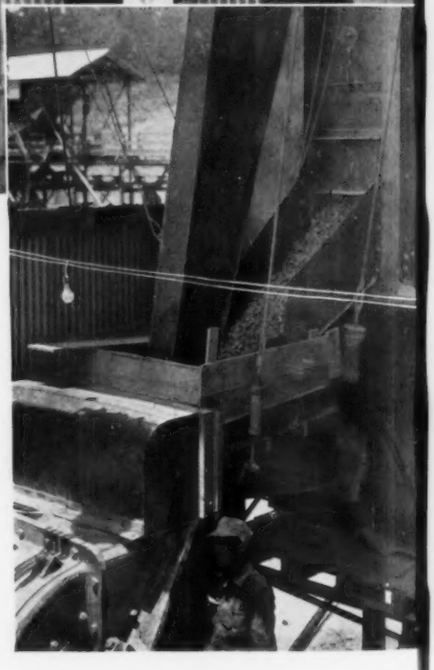
THE bigger the job, the more important the equipment —and the selection of Jeffrey-Traylor Feeders for the huge material handling operations of the Tennessee Valley project is further recognition of their dependability for responsible work.

These heavy-duty Feeders are setting the pace for the whole plant. Their unfailing operation insures an uninterrupted supply of material.

The key unit is the 36″x66″ Jeffrey-Traylor *Primary Feeder* which starts the tonnage through the plant. It maintains a uniform flow from the gyratory crusher to the belt conveyor up to 400 tons per hour. The two 48″x60″ Jeffrey-Traylor Secondary Feeders supply the hammer mill with an even feed the full width of the mill, each unit delivering 250 tons per hour.

For your own material handling operations, insure maximum economy by availing yourself of the ability of Jeffrey engineers and the capability of Jeffrey Equipment. Experience and efficiency are at your service.

Side view of the secondary Jeffrey-Traylor Feeder, as shown in the installation below.



One of the two secondary Jeffrey-Traylor Feeders for supplying the hammer mill.

THE JEFFREY MANUFACTURING CO.

917-99 North Fourth Street, COLUMBUS, OHIO

New York
Buffalo
Rochester
Philadelphia

Pittsburgh
Boston
Scranton
Cincinnati
Cleveland

Detroit
Chicago
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Milwaukee
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Denver
Salt Lake City
Birmingham
Dallas

JEFFREY MANUFACTURING CO., Ltd., of Canada
Head Office and Works: Montreal—Branch Offices: Toronto, Calgary, Vancouver

Jeffrey Products

Electric Vibrating Feeders, Screens and Conveyors
Crushers and Pulverizers
Sand and Gravel Handling, Washing and Screening Equipment
Chains and Attachments
Elevators and Conveyors
Trolley Conveyors
Sprocket Wheels and Gears
Coal and Ash Handling Equipment
Portable Loaders
Locomotives

THE NEW 5-TON GENERAL MOTORS TRUCK

$1,000 less than the average 5-ton truck

Business men with 5-ton loads to haul will want to see, inspect and learn the facts about this big, husky money-maker. They can put it to work with full assurance that it will save time and save money, day after day, year in and year out.

Priced $1000 lower than the average price of all other leading 5-ton trucks, this modern General Motors truck is truly an exceptional value. It has a GMC valve-in-head engine, of course . . . develops 94 horsepower and 230 ft. lbs. of torque. Valve seat inserts are of stellite, the carburetor is of the downdraft type, the rugged frame is 9" deep, the booster brakes have an unusually large braking area, and the brake drums are of cast nickel iron for greater economy. Add to these features a score of others, including full-floating rear axle, needle bearing universals and rugged spoksteel wheels—and the proof of this truck's overwhelming value is crystal-clear.

Whatever your hauling needs may be, there's a General Motors truck that fits exactly—one that's "engineered for the job" and therefore a more efficient worker and earner. Any GMC dealer will gladly tell you more or the facts will be mailed upon request.

GENERAL MOTORS TRUCKS and Trailers

GENERAL MOTORS TRUCK COMPANY *Time Payments Available Through Our Own Y. M. A. C.* **PONTIAC, MICHIGAN**

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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 27 September, 1934 Number 3

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1897.

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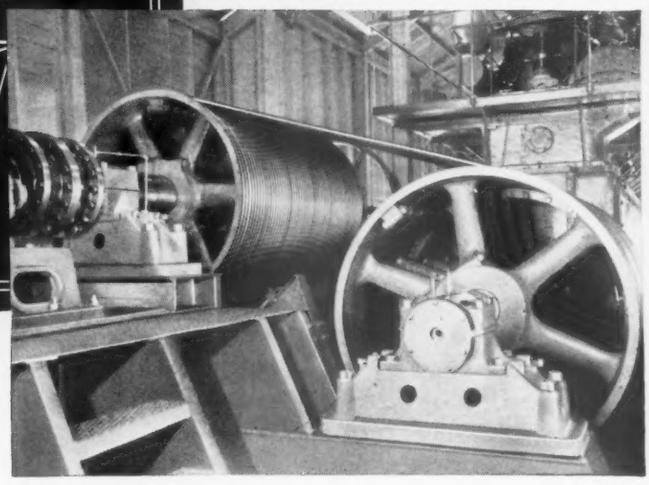
NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

WORLD'S LARGEST MULTI-V-DRIVE

G.T.M.–SPECIFIED
GOODYEAR EMERALD CORD V BELT
INSTALLED BY WORTHINGTON PUMP AND MACHINERY CORPORATION
HARRISON, NEW JERSEY
On 1000 H.P. Diesel-driven dredge pump for McWilliams Dredging Company
Number of belts: 54
ELASTIC ENVELOPE TAKES THE WEAR
HIGH TENSION SECTION
NEUTRAL SECTION
HIGH COMPRESSION SECTION

54 Goodyear Emerald Cord V Belts speed giant dredge pump



Matched construction insures close to 100% power-efficiency

THE practicability of using high-efficiency multiple V drives on heavy duty machinery is demonstrated by the 54-belt giant pictured here, said to be the largest in the world.

It is part of a 1000 H.P. Diesel-driven pump installation, recently made by the Worthington Pump and Machinery Corporation on a huge dredge operated by the McWilliams Dredging Company of Chicago.

Because efficiency, dependability and long life command a special premium in dredge service, the Worthington engineers took no chances. They specified 54 Goodyear Emerald Cord V Belts, 1½" wide, 420" long, as recommended by the G.T.M.—Goodyear Technical Man—for these reasons:

Emerald Cord V Belts are precision built in matched sets, uniform in length and accurate in cross-section —*insuring practically slipless grip!*

The load is carried entirely by a core of high-tensile low-stretch cords, deeply embedded in high quality rubber that neutralizes the forces of tension and compression in flexing over pulleys — *insuring greater strength, long flexing life and high fatigue resistance.*

As a result of this greater flexibility and grip, Emerald Cord V Belts transmit power with an efficiency close to 100%, and permit a uniformity of operation impossible with other belts.

SPECIFIED BY GTM

On many drives where even, maximum power is requisite—on textile machinery; ball, rod and tube mills; clay, heavy saw mill and paper working machinery; crushers, pumps and compressors, the G. T. M. recommends Emerald Cord V Belts and individually specifies them to your equipment.

Why not talk it over with this practical expert. Perhaps he could save you money, too. To get in touch with him, address Goodyear, Akron, Ohio, or Los Angeles, California—or the nearest Goodyear Mechanical Rubber Goods Distributor.

BELTS • MOLDED GOODS
HOSE • PACKING
MADE BY THE MAKERS OF GOODYEAR TIRES

THE GREATEST NAME IN RUBBER

NRA CODE

GOODYEAR

GREATER STRENGTH
RESISTANCE
TO ABRASION
LONGER LIFE

AMERCLAD
REG. U.S. PAT. OFF.
ALL-RUBBER

CABLES *Offer these Advantages . . and* MORE

"THEY can take it!" Just that briefly and conclusively, mine operators explain why **Amerclad All Rubber Cables** excel in all-around performance. More specifically, however, the reasons are these: kink-proof service! A tough hide that fights off water, muck, acids, oils, greases and any abrasive action! Greater tensile strength that defies wear! And—no less specific, are the contributing factors—the experience, resources and facilities back of the product. After all, there is no substitute for over 100 years of wire making experience in equipping a cable to "take it" in the roughest going. At the same time, there is nothing like control of every step in cable manufacture to keep a product constantly uniform and equal to every demand. Your request for samples of the various constructions of **Amerclad All Rubber Cables**—for mining, welding and surface operations—is invited.

1831

1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Empire State Building, New York
First National Bank Building, Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

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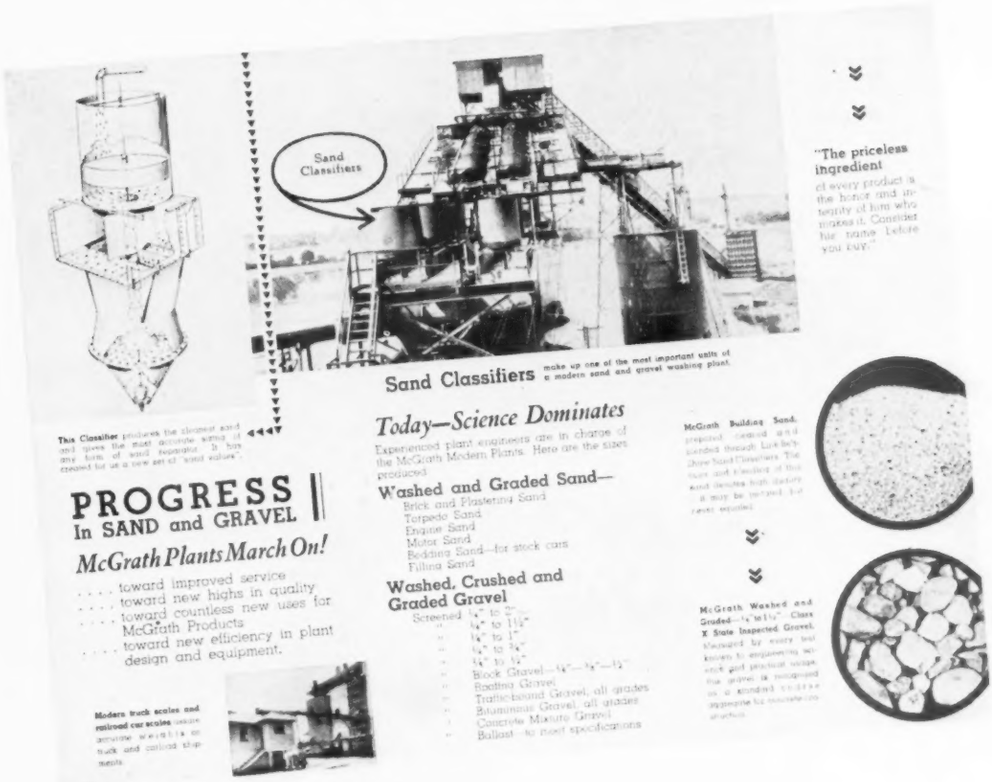
How McGrath endorses LINK-BELT


Sand Classifiers
Sand Classifiers make up one of the most important units of a modern sand and gravel washing plant.
"The priceless ingredient
PROGRESS In SAND and GRAVEL
McGrath Plants March On!
. . . . toward improved service
. . . . toward new highs in quality
. . . . toward countless new uses for McGrath Products
. . . . toward new efficiency in plant design and equipment.
Today—Science Dominates
Washed and Graded Sand—
Brick and Plastering Sand
Torpedo Sand
Engine Sand
Motor Sand
Bedding Sand—for stock cars
Filling Sand
Washed, Crushed and Graded Gravel
Screened
Block Gravel
Roofing Gravel
Traffic-bound Gravel, all grades
Bituminous Gravel, all grades
Concrete Mixture Gravel
Ballast—to meet specifications

The above reproduction is taken from an advertising circular just issued by McGrath Sand & Gravel Company, of Lincoln, Illinois.

Since 1912 Link-Belt has designed, built and equipped 10 complete plants for this company—at Mackinaw, Chillicothe, Pekin and Forreston, Illinois.

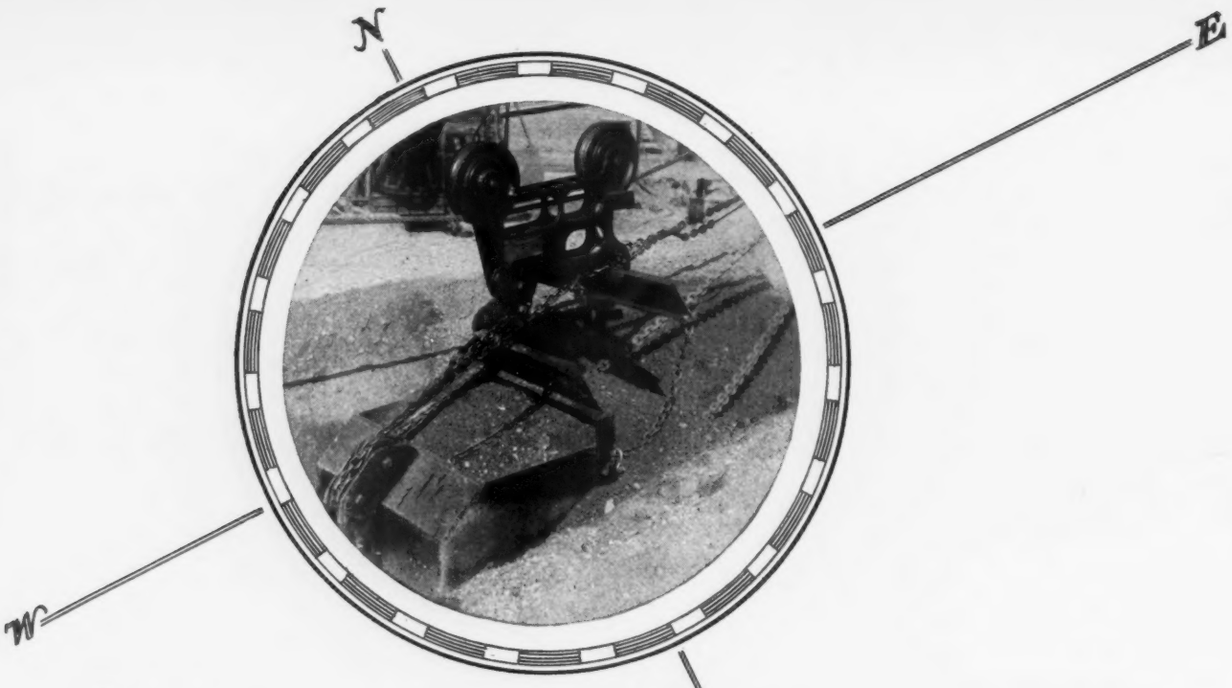
We are proud of this fine endorsement, and of our long and pleasant relations with such an outstanding producer of high grade sand and gravel.

LINK-BELT COMPANY 5108

CHICAGO PHILADELPHIA SAN FRANCISCO
INDIANAPOLIS Offices in Principal Cities TORONTO

Equipment for Handling and Preparing SAND » GRAVEL » STONE » CEMENT

by LINK-BELT.



Any time ~ any place ~ anywhere WILLIAMSPORT *wire rope is Dependable*

Williamsport "Purple Strand"—upholds and even advances Williamsport's standards of quality and endurance.

Unusual performance in ropes of small diameter is not so noticeable but in those of larger diameter —"Purple Strand" has proven its ability to take plenty of punishment on "tough" jobs, and stand up under it.

Williamsport is the *only* rope that insures you against getting the wrong grade of steel. Your protection also against substitution—The Telfax Tape—woven into the core of *every* rope — is a valuable protection and costs nothing.

Let us quote you on your next replacement — use Williamsport "Purple Strand" — convince yourself of its merit.

WILLIAMSPORT WIRE ROPE COMPANY

Main Office and Works
WILLIAMSPORT
PENNA.

Branch Sales Offices:
122 So. Michigan Ave.
CHICAGO

ACQUAINT YOURSELF WITH THE LATEST IN SHOVEL AND CRANE DESIGN

The Ohio Power Shovel Company
Lima, Ohio

Gentlemen:

Without obligation please send me copy of Bulletin checked.

Name_____

Address_____ State_____

Kind of Work_____ Position_____

TYPE 302 ☐ ¾ yard capacity.
TYPE 404 ☐ 1 yard capacity.
TYPE 502 ☐ 1¼ yard capacity.
TYPE 601 ☐ 1½ yard capacity.
TYPE 701 ☐ 1¾ yard capacity.

Remarks:

THESE bulletins illustrate and describe LIMA'S complete line of shovels, cranes, draglines and backdiggers, all of which are offered in sizes and types to exactly fit your requirements.

Shovel sizes range from ¾ cubic yard to 1¾ cubic yard capacities, inclusive, and in cranes the capacities range from 12 to 30 tons. All machines can be equipped for gasoline, Diesel or electric power.

Many advanced and exclusive features are incorporated in their design, features which assure faster and more economical operation.

The Coupon above, when filled out and mailed, will bring you a copy of any one or all of these bulletins.

The Ohio Power Shovel Company

DIVISION LIMA LOCOMOTIVE WORKS, INCORPORATED

HOME OFFICE LIMA, OHIO, U. S. A. FACTORY

CHICAGO 1543 Straus Building	NEW YORK 167th Street and Sedgwick Avenue	NEWARK, N. J. 317 Frelinghuysen Avenue	MEMPHIS 77 McCall Street
PORTLAND, ORE. 338 First Ave., S. W.	DALLAS 1301 So. Lamar St.		SALT LAKE CITY 134-140 Pierpont Ave.
SEATTLE 2244 First Ave. So.	SAN FRANCISCO 26-28 Fremont St.	SPOKANE East 3500 Block Riverside Ave.	LOS ANGELES 4900 Santa Fe Ave.

SHOVELS
CRANES
DRAGLINES
BACKDIGGERS

LIMA

3-4 YARD
1 YARD
1 1-4 YARD
1 1-2 YARD
1 3-4 YARD
CAPACITIES

LIKE AN EXTRA MAN *at the controls . . .*

• • • THE CHRYSLER AUTOMATIC CONTROL SUITS THE SPEED TO THE LOAD • • • •

Here's an air compressor with brains. It doesn't just cut in and out . . . it accelerates and decelerates automatically according to the air requirements.

This feature makes possible better operating efficiency. As a result, this 136 cubic foot displacement Chrysler compressor will equal the performance of compressors rating as much as 50% higher. That means real economy.

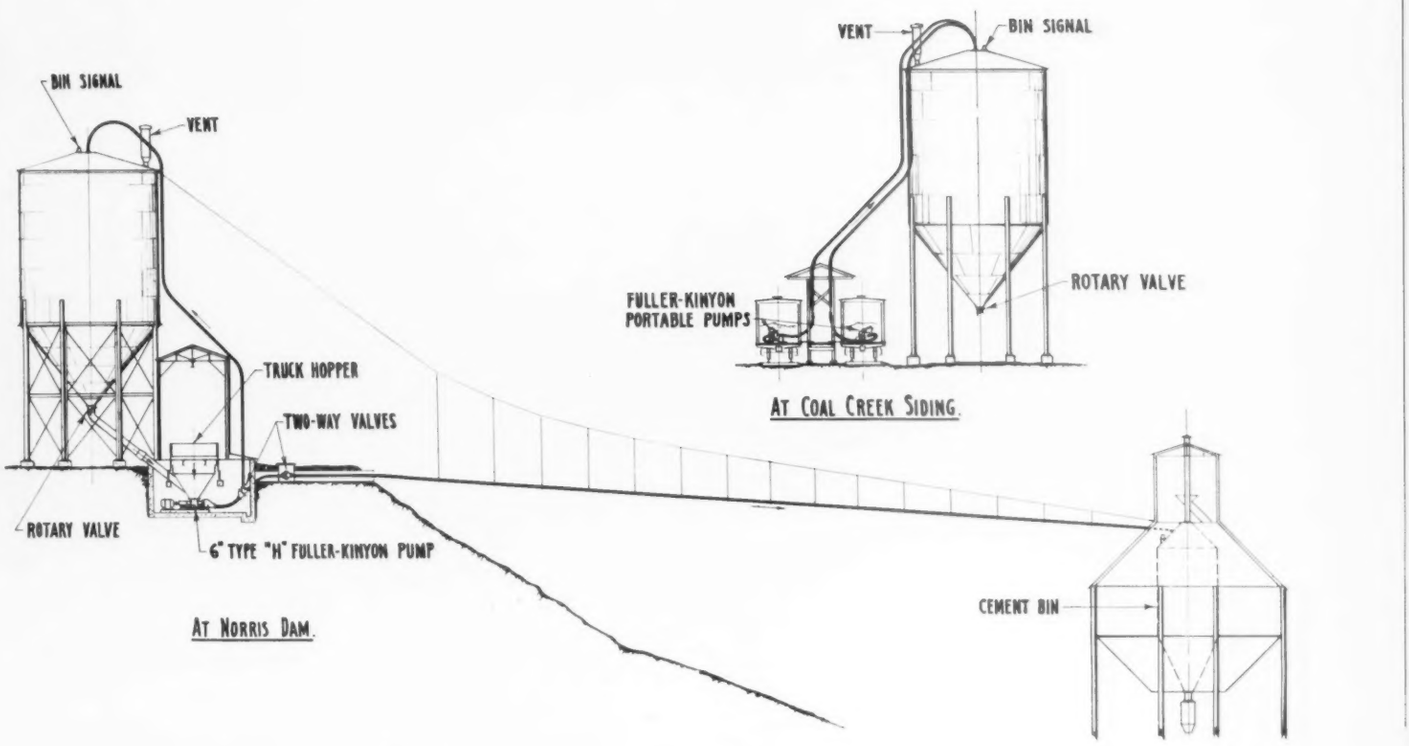
The valve action of Chrysler compressors is positive, because valves are mechanically controlled. Chrysler compressors are *really* portable . . . easy to get to the job. They are low in first cost and low in operating cost.

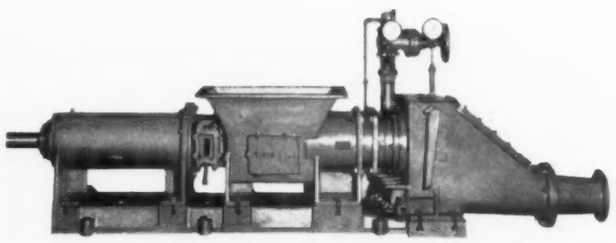
Like all Chrysler products, Chrysler Air Compressors benefit from the experience of one of the world's greatest engineering groups . . . and from Chrysler's vast facilities for precision manufacture. Let us give you the complete story.

Chrysler
AIR COMPRESSORS

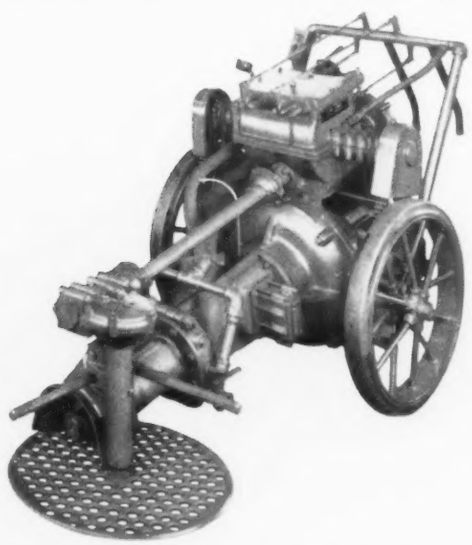
CHRYSLER MOTORS • AMPLEX DIVISION
DETROIT, MICHIGAN

HANDLING THE CEMENT FOR NORRIS DAM





The new Type "H" Fuller-Kinyon Pump is the most economical conveyor for transporting cement from hopper-bottom cars, truck hoppers and storage bins. It will convey cement far beyond the practical limits of mechanical systems. It is reliable and the accessibility of its parts avoids delaying the mixers. It is directly driven by gas engines or electric motors.



The improved portable Fuller-Kinyon Pump is the only conveyor capable of unloading box-cars and barges, and conveying cement to the mixers from the floors of storage sheds. These features, together with the layout flexibility of the pipe-line system, make it possible to meet the conditions of future jobs.

Advantage has again been taken of the unique features of Fuller-Kinyon Pumps to design the cement handling plants at Norris Dam for economy, speed and reliability. At the unloading station, two portable Fuller-Kinyon Pumps unload box-cars and deliver the cement to a truck-loading bin. The present arrangement provides for the unloading of four cars without transfer and when the demand for concrete increases, the platform and pipe-lines will be lengthened to accommodate more cars.

At the Dam, dump trucks discharge into a hopper over two stationery pumps of the type illustrated, one of which is for stand-by service. The cement is conveyed either direct to the mixing plant or elevated to a storage bin from which it is spouted to the pump hopper for transfer to the plant.

Fuller-Kinyon Cement Pumps were selected for the World's greatest dams, bridges, buildings and other concrete structures, as well as an impressive list of modest jobs. The reasons will be apparent from our fully illustrated bulletin. Write for a copy.

Fuller Company
CATASAUQUA, PENNA. U. S. A.

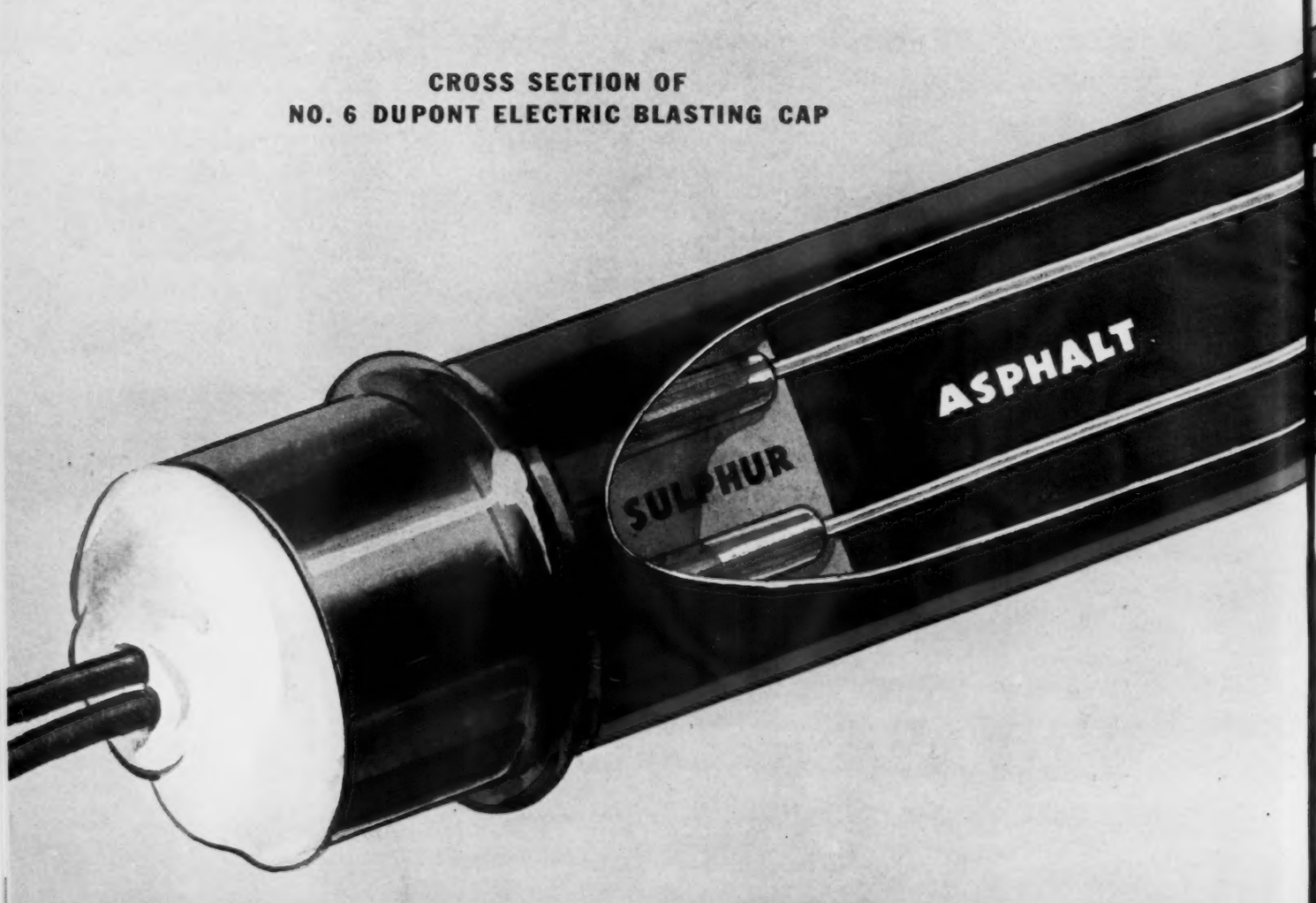
Chicago: 1118 Marquette Bldg.
Paris: E. Constantin, 105, Rue Lafayette.
Hamburg: Claudius Peters. Walhoff, Glockengiesserwall 2.

more than 8

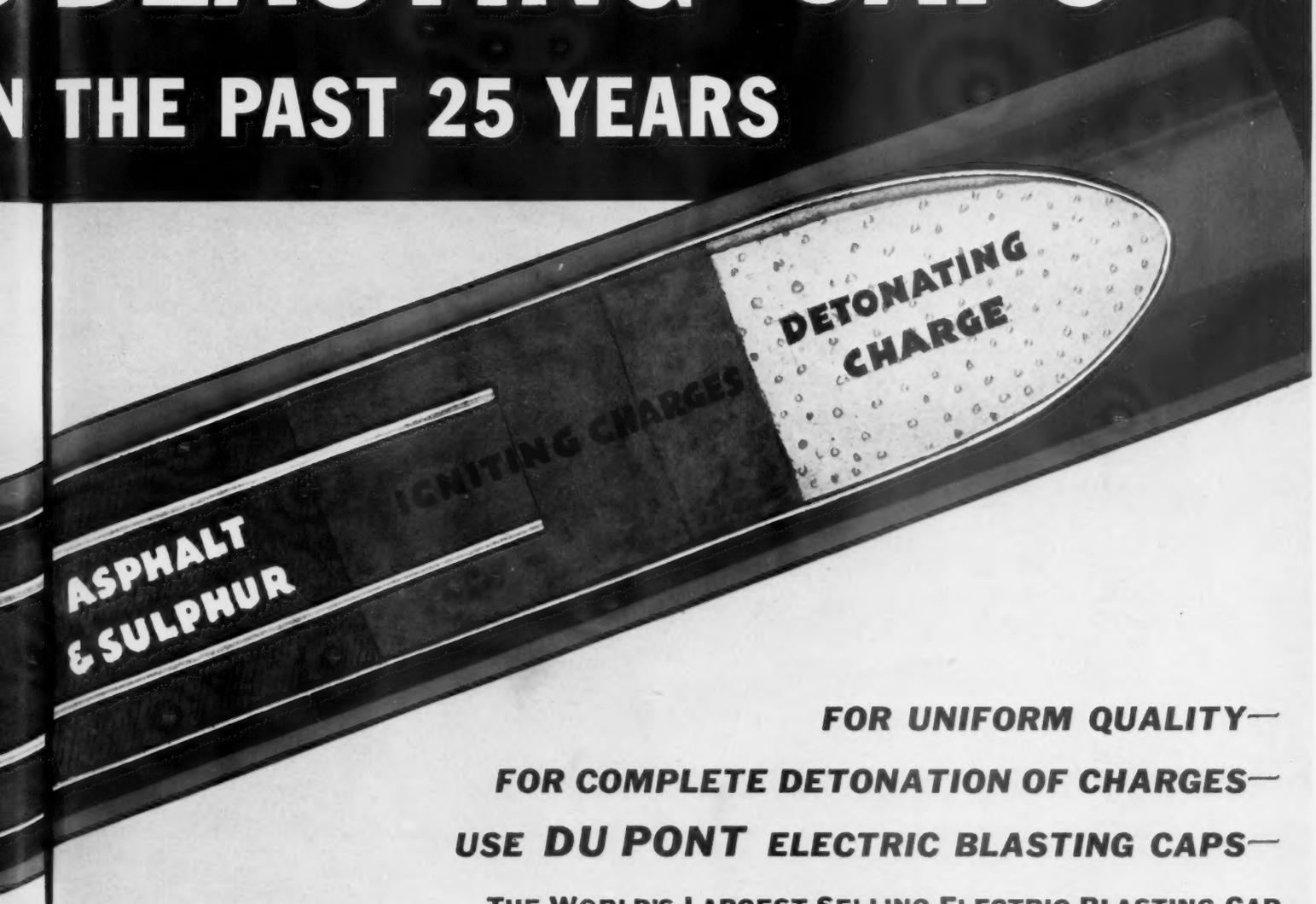
DU PONT ELECTRIC E

HAVE BEEN USED IN T

CROSS SECTION OF
NO. 6 DUPONT ELECTRIC BLASTING CAP



800,000,000
BLASTING CAPS
THE PAST 25 YEARS



FOR UNIFORM QUALITY—

FOR COMPLETE DETONATION OF CHARGES—

USE **DU PONT** *ELECTRIC BLASTING CAPS—*

THE WORLD'S LARGEST SELLING ELECTRIC BLASTING CAP

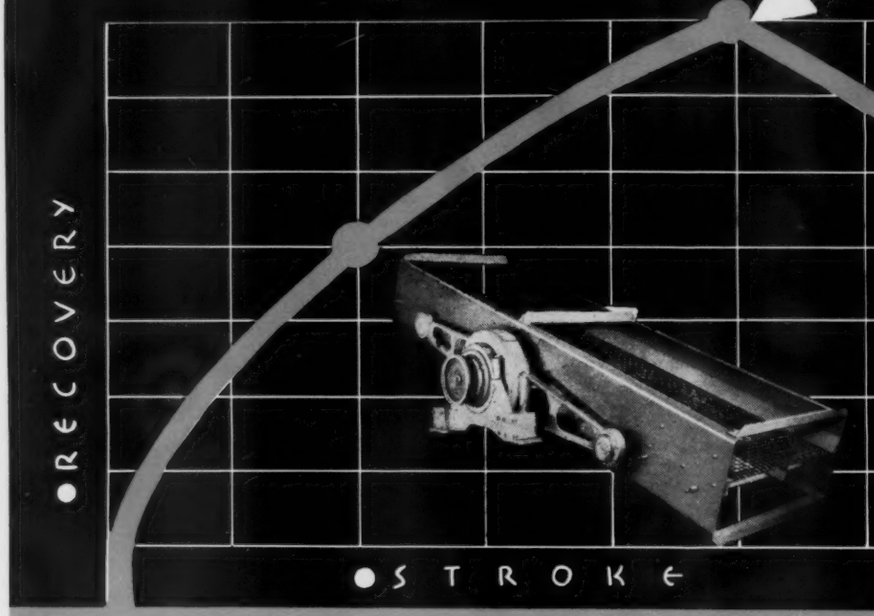
DU PONT

REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INC.

EXPLOSIVES DEPARTMENT · WILMINGTON, DEL.

ONLY Controlled Vibration GIVES EFFICIENCY Here

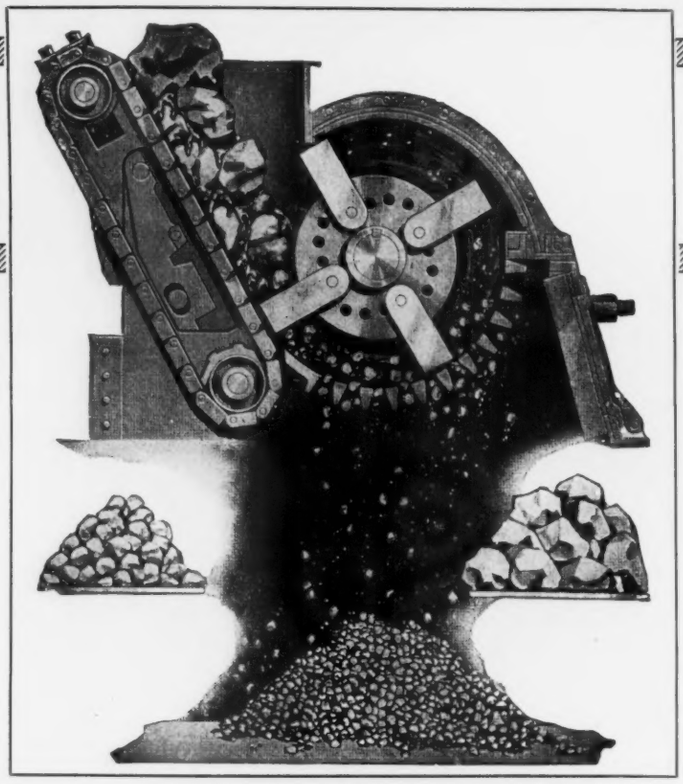


● Exclusive
JIGGER FEATURES

1. Vibration Adjustable to Suit the Material...
2. All Moving Parts are *Lubricated* in Oil...
3. Mounted on LIVE "floating" Rubber...
4. Extra Heavy Duty Construction...

PRODUCTIVE EQUIPMENT CORP.
210 East Ohio Street, Chicago, Illinois

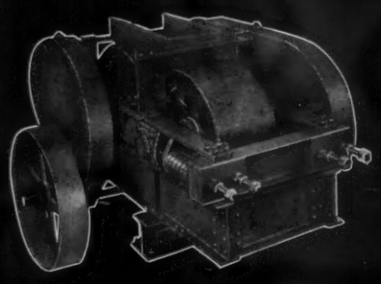
New Records in REDUCTION



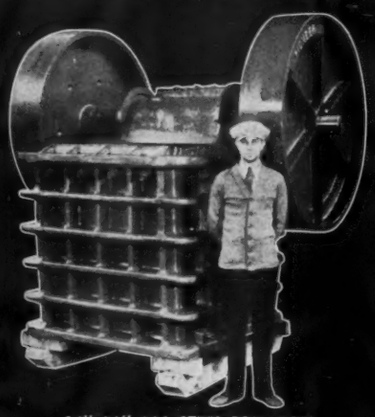
DIXIE MOGUL Non-Clog Hammermill is steadily adding to its reputation for **low-cost crushing** on thousands of tough jobs. There is real economy in every detail of Dixie design—the non-clog feature prevents choke-ups regardless of variations in the feed—the breaker plate with 26 times the average wearing area has unlimited endurance—extra large bearings and shafts, super-hard wearing parts, and massive construction throughout, insure trouble-free service. Choose the Dixie Mogul for all your crushing work, primary, secondary or fine reduction—forty sizes for all standard capacities.

DIXIE MACHINERY MFG. COMPANY
4209 Goodfellow Avenue **St. Louis, Missouri**

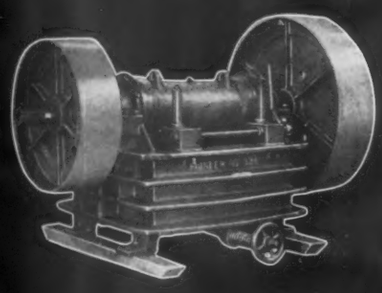
Write for the Dixie Catalog



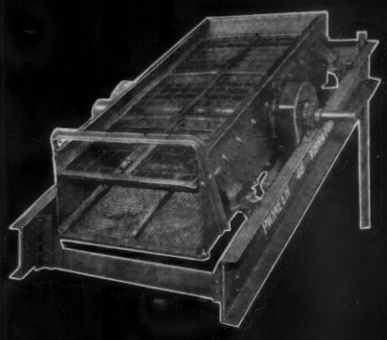
20"x40" ANTI-FRICTION BEARING ROLL CRUSHER
For fast reduction—takes materials up to 4" and reduces by 2" stages. Roll Crushers also made in 14"x24" and 18"x24" sizes.



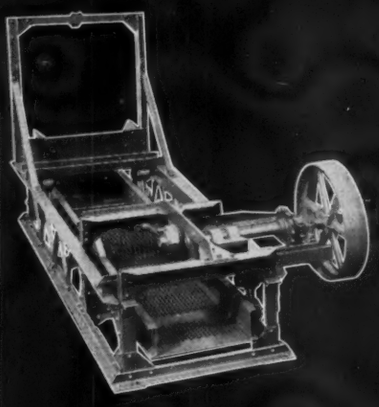
24"x36" ALL STEEL PRIMARY CRUSHER
Force feed lubrication—Overhead Eccentric—Enclosed Worm Gear Adjustment. Maximum discharge opening 6"—minimum 3".



836 ANTI-FRICTION BEARING JAW CRUSHER
Self-aligning SKF Bearings-with Patented Dust Proof Closures. Made in following sizes: 818, 824, 836, 1036 and 1536.



No. 48 VIBRATOR SCREEN
Positive drive—anti-friction bearing type. Made in 6 sizes—2'x4' to 4'x8'.



PIONEER SHAKER SCREEN
To meet strict tolerance. Plain or anti-friction types in six sizes.

HEAVY DUTY REVOLVING SCREEN
With Sand Jacket
A complete line of standard and heavy duty revolving screens, may be equipped with Scrubber and—or Sand Jacket.

PIONEER

Offers You { QUALITY ECONOMY RELIABILITY

IN THEIR COMPLETE LINE OF

ROCK AND GRAVEL EQUIPMENT

CRUSHERS Special features of Pioneer Crushers include a positive adjusting mechanism, enclosed dust proof worm gear, Chrome Nickel heat treated shaft, machined and ground, and dust proof cover over push and pull wedges. The base and pitman are of Carbon Electric Steel, heat treated, with manganese steel jaws.

CONVEYORS Built in four sizes of plain bearing conveyors—16 inch, 18 inch, 24 inch and 30 inch. Anti-friction bearing Conveyors, three sizes—18 inch, 24 inch and 30 inch. Frames are steel lattice type construction offering greatest strength with lightest weight. Also units in plain bearing or antifriction bearings for wood frame conveyors.

SCREENS Vibrator Screens for large capacities on material from No. 3 mesh down to dust are positive action, anti-friction bearing type, with self-aligning SKF bearing dirt proof housings and adjustable screen pan.

Shaker Screens are recommended where close tolerances are required, are equipped with SKF bearings in the crankshaft and hanger assemblies; enclosed water proof and dust proof wrist pins are standard equipment.

Revolving Screens for scalping and washing, are rigid in construction, built in sizes from 30 inch to 48 inch with or without sand jackets or scrubbers.

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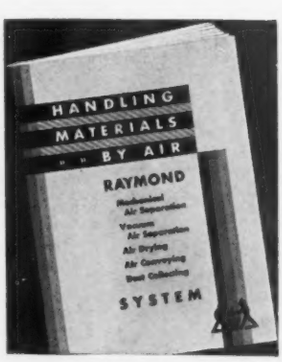

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ATLAS

EXPLOSIVES

VOLUME 27 NUMBER 3

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, SEPTEMBER, 1934

PWA Road Work Gives Jobs to 258,988 Men

10,578 MI. UNDER CONSTRUCTION

Progress made on the emergency construction of public-works highways to Aug. 25 under the supervision of the U. S. Bureau of Public Roads shows a total of 352 projects, estimated to cost $17,190,000, approved but contracts not yet awarded; 266 projects, estimated to cost $8,900,000, awarded but not yet under construction; 3,779 projects, estimated to cost $238,964,000, under construction; and 4,105 projects completed at a cost of approximately $151,295,000.

The 3,779 projects under construction involve 10,578 mi. of road and are giving regular direct employment to 258,988 men.

The above figures include projects involving funds provided by the Acts of June 16, 1933, and June 18, 1934.

Santa Cruz Cement Dock Soon Ready to Operate

The construction of the steel and concrete wharf of the Santa Cruz Portland Cement Co. at Santa Cruz, Cal., has been completed and installation of the cement pumps and piping is now being made. These will transport the cement from concrete silos on shore to ocean-going vessels at the end of the wharf. According to Joseph Riordan, plant superintendent, the company's self-unloading boat Santacruzcement is now on its way from New York and the first boatload of cement is expected to leave the pier about Sept. 15.

Ohio Lime Strike Ended; No Union Recognition

The strike at the Carey, O., plant of the National Lime & Stone Co., which lasted ten weeks has been settled by the men voting to return to work at the wages and working conditions in effect at the time the strike was called. This strike was settled without union recognition, which was originally its chief cause. Other plants of this company were not affected by this walkout. With the resumption of operations at Carey all the lime plants in the northwestern Ohio finishing-lime district are now operating and there seems to be little probability of any further labor trouble in this industry in the near future. The ten companies in this district are now uniformly paying a minimum wage of 44 c. per hr., although there is some difference in the wages paid in the higher brackets. None of the northwestern Ohio strikes resulted in increased wages.

Marquette Given Large Federal Cement Contract

The Marquette Cement Mfg. Co., was recently awarded a contract by the U. S. War Dept. for 130,000 bbl. of cement to be used in federal construction work in the Memphis, Tenn., district. Most of this cement will probably come from the company's plant at Cape Girardeau, Mo.

Award 2,000,000-Cu. Yd. Ft. Peck Gravel Contract

The Becker County Sand & Gravel Co., Detroit Lakes, Minn., which operates a number of plants in Minnesota and South Dakota, has been awarded a contract for 2,000,000 cu. yd. of sand and gravel for the Fort Peck Dam in Montana. The amount involved is said to be about $2,625,000.

NRA Approves Gaubier As Successor to Twaits

Frank Gaubier, of Los Angeles, Cal., has been approved by the N.R.A. as a member of the code authority of the aggregates industry under Code No. 109. He succeeds Ford J. Twaits, former president of the Consolidated Rock Products Co. of the same city.

★ The Feldspar Milling Co., Bowditch, N. C., has installed a Sturtevant air-separator in connection with an existing grinding mill to make possible finer grinding and an improved product.

★ The General Material Co., St. Louis, Mo., recently purchased a number of Jaeger Machine Co. truck mixers.

July Contract Awards Slightly Under June

YEAR'S TOTAL 90% OVER 1933

Construction awards through July continued above the corresponding monthly totals of last year according to F. W. Dodge Corp. The July volume of $119,698,800 for the 37 eastern states contrasts with $82,554,400 for July, 1933, and $127,116,200 for June of this year.

For the elapsed months of 1934 construction awards amounted to $973,861,500 for the 37 eastern states as against $514,667,800 for the corresponding seven months of 1933. The cumulative gain over 1933, amounting to about 90 per cent., was almost entirely due to the rise in publicly-financed construction projects growing out of the PWA program. This class of work alone totaled $624,273,200 while for the corresponding 7 months of last year publicly-financed contracts amounted to only $181,549,500.

Residential building contracts let during July fell below the respective totals for either the preceding month or July, 1933. For the year to date, however, residential awards are still above the total for the corresponding seven months of 1933; the gain amounts to about 11 per cent.

Non-residential building awards totaled $60,753,400 for July against $43,141,900 for June and $39,983,200 for July of last year. The cumulative total for this class of construction amounted to $339,191,700 as against $224,376,800 for the corresponding seven months of 1933.

Public works contracts during July fell below the volume of June but were more than twice as large as the volume reported in July of last year. For the year to date contracts for public works amounted to $406,060,000 as against only $121,094,300 for the corresponding seven months of 1933.

Public utilities awards in July were smaller than in June but were almost twice as large as in July, 1933. For the year to date contracts for this class of construction amounting to $76,982,800, were more than twice as great as in the like period of 1933.

Contemplated construction reported during July totaled $243,675,500 as against $313,882,300 for June and $447,678,300 for July of last year.

Producers Oppose 15% Government Price Cut

REQUEST COMPLETE EXEMPTION

An appeal for the complete exemption of the members of the crushed-stone, sand-and-gravel and slag industries from the provisions of Executive Order No. 6767 was presented on Aug. 3 to Gen. Hugh S. Johnson, Administrator for Industrial Recovery, by Otho M. Graves, chairman of the Code Authority of that industry. This is the order allowing members of industries, which are bound by their codes to bid in accordance with previously posted prices, to offer government agencies — federal, state, county and municipal—prices as much as 15 per cent. below the quotations filed by them under their open-price arrangements.

Mr. Graves' plea was accompanied by a report of the Code Authority's Technical Advisory Staff (A. T. Goldbeck and Stanton Walker), which gave the results of a questionnaire survey conducted among stone, gravel and slag producers, about 10 per cent. of whom, representing approximately 40 per cent. of the industry's production, furnished the information requested. Summarized, the results showed for the 327 companies reporting total profits of $11,099,099 in 1929, losses of $5,812,068 in 1932, and losses of $4,357,566 in 1933. The "average" company showed a profit of $34,000 in 1929, a loss of $14,900 in 1932, and a loss of $10,700 in 1933.

On the strength of this showing Mr. Graves pointed out that this industry has "operated under heavy losses for the last several years; the value of fixed assets and surpluses have decreased substantially; there has been a continuing and drastic curtailment of business." "Notwithstanding this," he added, "we have faithfully discharged our obligation under the recovery act to increase employment and to provide higher wages."

Referring to present conditions, Mr. Graves said: "Although our industries are still in a distressed condition due to abnormally low demand, we have been compelled since June 29" (the effective date of Executive Order 6767) "to operate under a code to which we have never agreed and concerning which we have not been given the opportunity either to explain our particular situation or to advance reasons why the executive order should not be applied to our industries." In other words, although the industry has agreed to the code under which it operates, it had no opportunity to agree or disagree with the terms of the executive order, which was applied to all industries having price-posting or "open-price" policies enforced by codes.

The plea and evidence submitted to Gen. Johnson were referred to the Division of Research and Planning of the N. R. A. "with a request for a prompt reply." Gen. Johnson said in reply, "As you know, the order itself required that an investigation of its operation be made, and we are now developing this to determine future policy." This refers to the third paragraph of that order, which reads as follows:

The Administrator for Industrial Recovery is directed to cause a study to be made of the effects of this order upon the maintenance of standards of fair competition in sales to public and private customers and to report to the President within 6 months of the date of this order.

The industry's code authority has had numerous conferences with the N. R. A. and has received the following replies to questions regarding operations under the order:

Question 1.—If a member of our industries quotes less than his filed price, it is our understanding that when bids are opened he would be expected to file a copy of his bid with the interested District Committee, and, since there is no provision of the order which would require such a member of our industries thereupon to adopt and file a price for all subsequent sales which is consistent with his bid, that his responsibility is merely to inform the District Committee of the measure of the tolerance provided in the Executive Order of which he has availed himself. Is this understanding correct?

Answer.—The responsibility of a member of the industry who quotes less than his filed prices, as permitted by the Executive Order, is to inform the District Committee of the measure of the tolerance of which he has availed himself.

Question 2.—The Executive Order relates to the purchase of goods or services by any agency or instrumentality of the United States, or any state, municipal or other publicity authority. It is therefore our understanding of the effect of the Executive Order that if a member of our industries avails himself of the tolerance provided by the Executive Order in the sale of materials to bodies politic, he does not thereupon incur the responsibility of making the bid price, reflecting the tolerance under his filed prices, available either to other purchasers of our materials or to any intermediate party standing between him and the body politic, such as a contractor or dealer. Since no such responsibility would then be incurred, it is our understanding that a member of our industries would not be able to sell below his filed prices to a commercial purchaser. Is our understanding in this regard correct?

Answer.—There is no responsibility on the part of the member of the industry to make the bid price reflecting the tolerance under his filed prices, available either to purchasers of materials or to any intermediate party, which are between him and the body politic, such as a contractor or dealer. He is not empowered to sell below his filed prices to commercial purchasers.

Question 3.—When a member of our industries files with the District Committee copy of his bid on a particular project which is lower than his filed price, it is our understanding of the Executive Order that he does not thereby modify or impair his price structure or obligate himself in any way to quote or to sell at the price specified in the bid on any business other than that specifically bid upon.

Answer.—The Executive Order does not modify or impair the price structure of members of the industry, other than on the specific project with a governmental agency, and it does not oblige members of the industry to quote or to sell at the price specified in such a bid on any business other than that specifically bid upon.

Question 4.—It is our understanding that under the Executive Order, tolerances shall be computed on the basis of plant prices and not delivered prices. Is this correct?

Answer.—Under the Executive Order, a producer may bid 15 per cent. below his published plant price, if his prices are filed upon a plant basis, and 15 per cent. below his published delivered price, if prices are quoted upon a delivery basis. All elements which are included in a delivered price may be included when estimating the amount of the tolerance.

Question 5.—Is it true that the purpose of the Executive Order was to avoid the receipt by bodies politic of uniform quotations on individual projects? If so, will this condition not still exist if members of our industries take full advantage of the tolerances permitted by the Executive Order, particularly since our code is quite specific in its protection of the right of members of our industries to meet lower competitive prices under any circumstances?

Answer.—It is not believed that the entire purpose of the Executive Order is to avoid receipt by bodies politic of uniform quotations on individual projects.

Question 6.—It is observed that the Administrator for Industrial Recovery is permitted, when certain requirements are met, to reduce the tolerance in a given industry from 15 per cent. to as low as 5 per cent. What procedure has been provided by the Administration for the consideration of any presentation from this Code Authority, seeking to justify in our case a reduction of the tolerance to the minimum provided in the Order?

Answer.—No procedure has been set forth to date for the handling of requests by Code Authorities to reduce the amount of the tolerance in a given industry. A simple petition from any Code Authority will undoubtedly be all that the Administration will require.

Lime Strike in Alabama is Ended by Agreement

According to V. C. Finch, representative of the American Federation of Labor, an agreement has been reached between the management of the Saginaw Lime Works, Saginaw, Ala., and 100 striking employes. Mr. Finch stated that the company expects to resume operations in the near future and that the agreement would be used as the basis of settlement between employes and employers at other plants in the Birmingham district.

Ohio Requires Bidder to Certify Code Compliance

The State Highway Dept. of Ohio is requiring all bidders furnishing it with material or equipment to sign the following code-compliance certificate.

The undersigned hereby certifies that my (our) business is conducted in compliance with the provisions and regulations of the National Industrial Recovery Administration and/or of such state code or codes as govern my (our) industry and that my (our) business has been registered as provided for by the code or codes governing my (our) industry.

★ The Mercer Lime & Stone Co., Mercer, Pa., has just completed the installation of equipment for the production of pulverized limestone at its lime plant at Branch, Pa.

★ The Wedron Silica Co., Wedron, Ill., has completed the installation of an 8-in. by 5-in. by 44-ft. centers Stephens-Adamson bucket elevator which handles 30 tons per hour of silica sand.

Adjustment Agencies Held Not Accountable

NO INDIVIDUAL RESPONSIBILITY

Members of the Regional Adjustment Agencies set up under the mineral-aggregates code (No. 109) to consider complaints of alleged violations of the code are not liable, either individually or collectively, for damages due to financial losses which their decisions may cause to the respondents to such charges. This is made clear in a letter of Aug. 14 from Robert S. Keebler, assistant counsel of the N.R.A.'s Legal Division. Mr. Keebler says:

"The function of such committees is quasi-judicial in character, and is surrounded by the privilege and immunity attendant upon the actions of all public officers. So long as such quasi-public officers act in good faith, they are free from liability. They can be rendered liable only for wilful or wanton or grossly negligent (implying malice) misconduct prejudicially affecting the property rights of others.

Germany Forbids Lime Plant Capacity Increase

An order issued by the German Minister of Economics on July 17 forbids until December 31, 1935, the erection of any new plants or the expansion of any existing plants making lime products, including limestone, dolomite, marl, calcined lime and mixtures or other products made from lime. The order is similar to orders previously issued prohibiting the increase of production capacity in the cement, stone, nitrogen, superphosphate and other industries.

It is computed that the lime industry is so far overexpanded and that demand has fallen so much that only 20 to 25 per cent. of the existing production capacity is being utilized. There are apparently no official figures on capacity; in 1926 the total German capacity was estimated at some 13,000,000 tons and the capacity has increased since then. Total sales were 4,700,000 tons in 1930, 3,500,000 tons in 1931 and 2,800,000 tons in 1932.

Spokane Cement Plant Installs New Equipment

★ The Spokane Portland Cement Co., Spokane, Wash., has purchased a 16-ft. Sturtevant separator which is to be used in closed circuit with a new Type B Babcock & Wilcox mill for clinker grinding.

Floating Mixing Plants for Wheeler Dam Finished

★ The TVA has completed the construction of the four floating concrete central-mixing plants which will supply the concrete used in the construction of Wheeler Dam, near Florence, Ala. They will be put into operation when pouring of concrete is started in the near future. The dredge "Kentucky," which is to supply all aggregates for the dam, is already in operation on the Tennessee River below Florence and considerable material has been stockpiled.

Each mixing plant is mounted on an all-welded Ingalls steel barge. Equipment includes Norris K. Davis 56-S concrete mixers; Blaw-Knox cement bins, rotary cement gates and batchers equipped with Kron dial scales, water measuring tanks and clamshell buckets; American Hoist & Derrick Co. revolving cranes handle the concrete from the mixer into the cofferdams.

The St. Marys Cement Co., St. Marys, Ont., which has been operating at reduced capacity for several years has resumed full operation. Some of the kilns now in use had not operated for three years.

Material Purchases of PWA Increase in May

$12,448,140 TOTAL FOR MONTH

Reports of P. W. A. material purchases for May show a great increase in the amount of money spent for sand and gravel. In that month purchases of these materials rose suddenly to $1,797,504, more than five times as large as the former "high" ($328,075) in April.

Cement purchases amounted to $831,238, the highest in P. W. A. history, except April, when the total reached $1,264,718. The 8-month total is $4,082,238, which is second only to the $4,269,477 spent in that period for marble, granite, slate and other stone products except crushed stone.

Crushed-stone purchases have not shown much change, the May figure, $56,068, being only a little higher than the 8-month average. The total purchases for the period amount to $403,502.

The accompanying table shows the record for each month from October, 1933, to May, 1934, inclusive, and gives the 8-month total for each of ten different types of material.

Material purchases for public-roads projects unfortunately are not available by types of materials so it is necessary to estimate the portion applicable to nonmetallic minerals and their products. The figures shown in the table for public roads represent but 45 per cent. of the total material purchases, since experience has shown that the nonmetallic materials—cement, sand and gravel and crushed-stone—used in road-building bear approximately that relation to the total. In May these purchases amounted to $12,448,140 or more than two and one-half times as much as the sums spent for P. W. A. projects other than roads. The 8-month total, $42,119,767, represents 67.4 per cent. of all P. W. A. material purchases, which had reached $62,493,860 by the middle of May.

NONMETALLIC MINERALS AND THEIR PRODUCTS PURCHASED FOR PUBLIC-WORKS PROJECTS IN 1933 AND 1934, BY MONTHS

Material	Month Ended												Totals (8 months)
	Oct. 15, 1933	Nov. 15, 1933	Dec. 15, 1933	Jan. 15, 1934	Feb. 15, 1934	Mar. 15, 1934	Apr. 15, 1934	May 15, 1934	June 15, 1934	July 15, 1934	Aug. 15, 1934	Sept. 15, 1934	
Cement	$71,373	$366,384	$361,635	$370,668	$444,559	$371,665	$1,264,718	$ 831,238	.....	.....	.....	.....	$4,082,238
Sand and gravel	13,164	107,453	313,009	283,483	289,677	240,309	328,075	1,797,504	.....	.....	.....	.....	3,362,671
Crushed stone	90,301	23,074	40,880	56,675	19,517	31,383	85,604	56,068	.....	.....	.....	.....	403,502
Marble, granite, slate and other stone products	38,787	403,924	1,713,412	513,900	368,201	209,684	401,386	620,183	.....	.....	.....	.....	4,269,477
Clay products	39,735	152,717	254,685	260,434	234,522	327,051	426,879	509,865	.....	.....	.....	.....	2,205,888
Concrete products	19,059	644,544	703,572	517,354	412,052	351,284	392,902	501,824	.....	.....	.....	.....	3,542,591
Glass	.....	.....	18,254	72,068	.....	11,384	29,421	41,152	.....	.....	.....	.....	172,279
Paving materials and mixtures	43,244	178,268	135,289	133,857	113,870	138,865	297,062	205,603	.....	.....	.....	.....	1,246,058
Roofing, asphalt shingles, etc.	.....	53,595	39,261	74,919	53,009	229,370	132,024	120,501	.....	.....	.....	.....	702,679
Wall plaster, wall board, etc.	.....	.....	14,935	32,814	73,021	56,062	85,671	114,202	.....	.....	.....	.....	376,705
Totals	$315,663	$1,929,959	$3,594,932	$2,316,172	$2,008,428	$1,967,057	$3,443,742	$4,798,140	.....	.....	.....	.....	$20,374,093
Public roads projects[1]	[2]	[2]	[2]	2,819,250	2,857,500	3,330,000	4,950,000	7,650,000	.....	.....	.....	.....	42,119,767
Grand totals	[3]	[3]	[3]	$5,135,422	$4,865,928	$5,297,057	$8,393,742	$12,448,140	.....	.....	.....	.....	$62,493,860

[1] Not available by type of material. These figures represent 45 per cent. of the totals, as approximately that portion is spent for cement and aggregates.
[2] Not available for this month separately.
[3] See Note 2.

Stone Directors View Future With Optimism

PLAN EXPANSION OF ACTIVITIES

The annual meeting of the board of directors of the National Crushed Stone Assn., held at The Homestead, Hot Springs, Va., Aug. 16, showed a spirit typical of the industry in meeting the problems with which it is confronted. Almost unanimously the directors present admitted an improvement in business over previous years and were confident that the future would show continued improvement. The fact that association finances are in a better condition than at any previous time in some years also indicates that the producers have not forgotten the value of the association work, which has been partly suspended for the last year or more due to the pressure of code matters. Another cheering indication of the improved spirit in this industry was the fact that during the first 6 months of 1934 twenty-four new companies had become members and only one resigned, making a present total of 198 members. The fact that most of the new members are small companies indicates the approval of the association's work by the smaller operators who in the past did not consider the association of much value to them.

Many routine matters were discussed and the customary reports read and approved. Among other matters it was decided to resume the publication of the "useful information" bulletins which in the past had been issued when anything of value to the members was uncovered.

The problem of deciding on the time and place of the next annual convention of the industry and the holding of an exhibit was left with the executive committee. The two new directors, W. P. Beinhorn and Norman Kelb, Otho M. Graves, chairman of the Code Authority and V. P. Ahearn, executive secretary of the Code Authority and of the association were introduced. Mr. Graves and Mr. Ahearn then led an informal discussion of the code and its application to the mineral-aggregate industries and of general N. R. A. matters. It was evident from the tone of this discussion that the crushed-stone directors are overwhelmingly in favor of the code and expect even greater benefits in the future than have yet been obtained.

Earlier in the meeting A. T. Goldbeck, director of the Bureau of Engineering, submitted a report of the work accomplished by his department during the first half of the year. Code work, he said, had interfered with many of the activities of his department but much important work had nevertheless been done. He briefly described a number of technical problems which had received attention during this period and gave a *résumé* of the work done through his membership on many important technical committees.

Much of the work being done in the association laboratory, said Mr. Goldbeck, has not yet reached the point where it can be discussed in any detail but considerable attention has been given to research on the bituminous type of pavement which is now in great demand for secondary highways. The circular testing track built in the association laboratories four years ago, he said, has been of great value in this work. Some of the tests made were performed for individual producers so that they might determine which of a number of mixtures would be the most durable. Other technical work under way was also discussed.

The following directors were in attendance:

Russell S. Rarey, Marble Cliff Quarries Co., Columbus, O., president and chairman of the board.
W. M. Andrews, New Castle Lime & Stone Co., New Castle, Pa.
C. C. Beam, C. C. Beam, Inc., Melvin, O.
W. P. Beinhorn, Trap Rock Co., Minneapolis, Minn.
L. J. Boxley, W. W. Boxley & Co., Roanoke, Va.
F. T. Gucker, John T. Dyer Quarry Co., Norristown, Pa.
Norman E. Kelb, Erie Stone Co., Indianapolis, Ind.
E. J. Krause, Columbia Quarry Co., St. Louis, Mo.
Thomas McCroskey, American Limestone Co., Knoxville, Tenn.
J. A. Rigg, Acme Limestone Co., Alderson, W. Va.
H. E. Rodes, Franklin Limestone Co., Nashville, Tenn.
James Savage, Buffalo Crushed Stone Co., Buffalo, N. Y.
F. W. Schmidt, Jr., North Jersey Quarry Co., Morristown, N. J.
L. W. Shugg, General Electric Co., Schenectady, N. Y.
W. L. Sporborg, General Crushed Stone Co., Syracuse, N. Y.
Stirling Tomkins, New York Trap Rock Corp., New York, N. Y.
T. I. Weston, Weston & Brooker Co., Columbia, S. C.
A. L. Worthen, Connecticut Quarries Co., Inc., New Haven, Conn.
F. O. Wyse, Bucyrus-Erie Co., South Milwaukee, Wis.

The following guests were also present:

V. P. Ahearn, executive secretary, National Crushed Stone Assn. and of the Code Authority.
Col. W. W. Boxley, W. W. Boxley & Co., Roanoke, Va.
J. R. Boyd, executive secretary, National Crushed Stone Assn.
A. T. Goldbeck, director, Bureau of Engineering, National Crushed Stone Assn., Washington, D. C.
Otho M. Graves, chairman of the Code Authority of the mineral-aggregates industries.
A. W. McThenia, Acme Limestone Co., Alderson, W. Va.
Nathan C. Rockwood, *Rock Products*, Chicago, Ill.
Mr. Simmons, Weston & Brooker Co., Columbia, S. C.
W. E. Trauffer, PIT AND QUARRY, Chicago, Ill.

★ Bird and Sons, East Walpole, Mass., have just completed the construction of a new crushed stone plant in that city. A complete Sly dust collecting system has been installed in this plant.

Cement Plants Reopen After Long Shutdown

OTHERS PLAN TO RESUME LATER

Judging from the fact that few cement plants shut down during the month of August the industry expects the demand for cement to hold up longer than usual this year. The few plants which did shut down announced that they would reopen after their stocks had become somewhat depleted, which was expected to be one or two months. The plants which reopened during August included the Colorado Portland Cement Co., Boettcher, Colo.; the Lehigh Portland Cement Co., New Castle, Pa., and Powderly, Ala.; Alpha Portland Cement Co., Ironton, O. It is also reported that the plant of the Lehigh Portland Cement Co. at Mason City, Ia., will go into operation the first week in September.

Permissive Area Scheme For Missouri Approved

The National Recovery Act Administrator has approved, "on an experimental and tentative basis for a trial period of 90 days," a "permissive" area scheme for Missouri. The areas set up by the Missouri State Committee under the aggregates code (No. 109)—see PIT AND QUARRY, May, 1934, p. 20—have been approved with the following changes:

Vernon County has been taken out of the Joplin "permissive" area, Carroll and Henry Counties from the Kansas City area, and DeKalb County from the St. Joseph area. All those portions of the following counties originally included within the areas defined have been removed: Chariton County from the Chillicothe "permissive" area; Chariton, Miller and Osage Counties from the Blackwater area; Shelby, Monroe, Audrain and Lincoln Counties from the Hannibal area; Gasconade County from the St. Louis area; and Perry, St. Genevieve, Mississippi and New Madrid Counties from the Cape Girardeau area.

Of the 56 counties and 13 parts of counties embraced in the original 9 areas, 10 counties and 6 portions of counties were not approved. The trial period expires Oct. 12.

The United States Gypsum Co., Chicago, Ill., announces the purchase of the Star Roof Corp., Southgate, Los Angeles, Cal., on Aug. 1. The plant will be operated under the direction of the Los Angeles office of the company.

★ The Diamond Iron Works, Inc., Minneapolis, Minn., has sold to the government three portable plants equipped with jaw crushers, bucket elevators, rotary screens and bins which can be used for either crushed stone or sand and gravel production.

Hand-Loading Quarry Costs to be Studied

OWNERS ASK WAGE EXEMPTION

Determined to find out whether the labor provisions of the crushed-stone, sand-and-gravel and slag industry code will make possible a monopoly in the mechanized plants through elimination of hand-loading quarries, the Industrial Appeals Board has directed the Code Authority to submit information on the cost of doing business under each type of operation.

The Code Authority was further instructed to present data on "which code provisions might prevent small operators from continuing in business."

Thus, the troublesome question of hand-loading *versus* mechanized quarries was again projected into the recovery picture—its third appearance. When the code was under consideration, the small operators who use hand labor exclusively insisted they would require a wage and maximum hour differential if they were to continue in business. That was denied them. Shortly after the N. R. A. pact was made operative, the same group returned with testimony based on operating experience which, they contended, conclusively proves that they can not compete with the machine-equipped plants and observe the code. They asked an exemption and it was denied.

Creation of the Industrial Appeals Board furnished a vehicle through which the complaint could be carried for a third time to the recovery administration. This board was set up by Gen. Hugh S. Johnson as a successor to the Darrow board, to furnish a forum for the "little fellow" when the group headed by Clarence Darrow expired after a short and hectic life.

Of the dozens of complaints which had been filed and on which hearings were asked, only about 15 were found to come within the jurisdiction of the board, and the first of these to be heard concerned itself with the hand-loading operators' protest. To qualify for hearing, it is necessary to show that the complainant has previously made reasonable efforts to pursue his rights and remedies within existing established agencies.

The complainants were A. H. Armstrong, representing the Eldred Crushed Stone Co., Eldred, Ill., and George O. Hoffstetter, representing the Staunton Tie & Lumber Co., Jerseyville, Ill. They, with others, had asked and were denied exemption several months ago, after opponents made the claim that their production and sales difficulties are due to lack of operating experience, poor locations and similar reasons. Their argument that the nature of their product does not allow the installation of mechanical loaders was disputed by spokesmen for the mechanized plants. After considering the testimony presented at that hearing, the recovery administration denied the propriety of hour and wage differentials in favor of hand-operated plants, thereby making it possible for the concerns to lay their case before the Industrial Appeals Board.

Mr. Armstrong charged that the Code Authority for his industry is dominated by the large units in the trade and that relief has been refused him and others similarly situated for that reason.

"We are not unwilling to comply with the code," he said, "but we simply can not get enough money for our product, in competition with machine-operated plants, to pay the code scale of wages."

Mr. Armstrong, a quarry man for more than a quarter of a century, no longer is operating his business. Mr. Hoffstetter, the other complainant, is operating his plant, but he admitted to the appeals board that he is not paying code wages.

Both Messrs. Armstrong and Hoffstetter insisted that if code wages are required, the "little fellows" will be driven out of business. It is to prevent such an eventuality that the Industrial Relations Board was created, it was pointed out.

Speaker Henry T. Rainey addressed a letter to the committee in which he declared the application of code wages has thwarted the purposes of the National Industrial Recovery Act since it has thrown about 40 men out of work in his district, which includes the area in which the Eldred and the Hoffstetter plants operate.

"Hand-operated plants absolutely can not compete with near machine-operated plants and pay the same wages," the speaker wrote. He also asserted that the workers are willing and anxious to go back on the job for 20 and 25 c. an hr., the wages which the operators feel that they can pay and make a profit, but if the 40 c.-an-hr. wage scale is enforced, the plants not now out of business must close.

V. P. Ahearn, executive secretary of the Code Authority, opposed the granting of the exemption asked, with the warning that such action will be followed by a flood of others. No evidence has been uncovered as yet, he said, which would justify the assertion that code wages will drive any concern out of business.

Chairman Amos J. Peaslee of the board inquired whether a wage differential based on volume of production might offer a possible solution to the problem. Labor Adviser John L. Goshie, who had previously stated that "there is no such a thing as an out-and-out hand-operated plant," answered that a proposed cost-accounting system submitted by the industry might show that machine-operated plants enjoy no advantage over manually operated mills.

The board requested the Code Authority to include in its report data bearing upon the extent to which the code is being observed.

Safety Men Meet in Cleveland in October

CEMENT AND QUARRY PROGRAMS

The Twenty-Third Annual Safety Congress and Exposition of the National Safety Council, which will be held October 1 to 5, 1934, at Cleveland, O., promises to be fully as interesting and instructive as have been the preceding meetings. The official program which has just been issued shows a total of 120 sessions and more than 350 speakers with separate programs for almost every industry. An attendance of 8,000 delegates alone is expected.

Much of the subject matter of the various sessions is of interest to producers of non-metallic minerals in addition to the sessions held specifically for these industries. A feature of the meeting will be the subject sessions. Among the subjects in these sections of interest to producers are: "Mechanical Methods of Handling Materials," "Safe Use of Electricity in Industry," "New Workers," "Dust in Industry," and "Why People Fall."

The Congress will open Monday morning, Oct. 1, with the usual invocation, roll call, etc. Meetings of the Cement Section will begin Tuesday, Oct. 2, with J. B. Zook, Great Lakes Portland Cement Co., Buffalo, N. Y., as chairman, and those of the Quarry Section will start Wednesday, Oct. 3, with Otho M. Graves, General Crushed Stone Co., Easton, Pa., as chairman. The Joint Cement and Quarry Section will be held Thursday, Oct. 4.

Papers to be presented at the cement meeting include: "Anaylsis of Accidents in the Cement Industry," "Preventing Accidents from Sliding and Flooding Materials in the Cement Industry," and "Safetyizing Transportation in Cement Mills and Quarries." Quarry papers include: "Non-Occupational vs. Occupational Accidents to Industrial Employees," "Value of Accident Facts in Promoting Safety Interest," and "Practical Methods of Studying the Effect of Poor Health on Accident Frequency." Papers to be presented at the joint session include: "Preventing Falls of Persons in the Cement Industry," "Hand Tool Accidents and Their Prevention," and "How to Investigate, Report and Capitalize Our Accidents."

New Minnesota Roofing Granule Plant Operating

★ The Minnesota Mining & Mfg. Co., Minneapolis, Minn., has completed the construction of a new roofing granule plant in Wausau, Wis., representing a reported investment of $300,000. Equipment includes a T. L. Smith mixer, Cottrell Electric precipitators, crusher, driers, coolers and other equipment. L. A. Hatch is local manager.

F. H. A. Plan Covers Quarry Structures

MOVABLE EQUIPMENT EXCLUDED

One of the most important news happenings of the month at Washington from the standpoint of the industry was the announcement that the huge federal housing program launched by the government for modernization work will extend its full benefits for renovation of structures other than residences, including permanent quarry structures.

While the legislation which made the project possible is known as the Federal Housing Act and its chief purpose is to recondition the homes of America, it is by no means restricted to that field.

Repair and conditioning of quarry shelters, office buildings and garages, reconstruction of living quarters, painting, electric wiring, plumbing and sanitation installations are among the jobs which have been made possible.

In short, any structural work that is attached to permanent buildings so as to become a part thereof, is properly within the law. This, of course, excludes movable equipment and machinery.

The operations of the act are most simple. Loans of from $100 to $2,000 are available at institutions accepted by the F. H. A., most of whom already are widely advertising the fact of their acceptance. The financial institutions that have been accepted by the Administration and whose loans will be guaranteed up to 20 per cent of the total amount lent, already run into thousands, with billions of dollars in readiness for call. With these guaranties representing many times the losses experienced on "character" loans in banking history, the willingness of banking houses to coöperate is readily understandable. To date it is estimated that the credit facilities which serve 87,000,000 persons in the United States are ready to lend under the F. H. A.

Unless extended by the housing administration, the notes must be repaid within three years. The lending institutions are not requiring indorsers, co-makers, or sureties and are not permitted to charge more than $5 on each $100 of credit for discount or other fees.

One of the qualifications for loan insurance affecting business properties, such as quarries, sets forth that "notes may be signed by lessees other than those which may be classed as owners, provided that the lease requires the lessee to make alterations, repairs and improvements, and provided further that the final termination date of the lease is at least six months beyond the final maturity of the note."

To obtain a loan it is only necessary for the applicant to assure the financial institution on the following points: That he is the owner of the property (or the lessee under the conditions outlined above); that the annual income of the signer of the note is at least five times the face value of the note; that mortgage payments have been kept up to date, and that no past liens or encumbrances stand against the property; and that the money will be used solely for property improvement.

New Ohio Plant Produces Washed Sand and Gravel

★ The Penry Sand and Gravel Co., Newmans, O., put into operation a new sand and gravel plant on July 16. The plant is said to be one of the best equipped in that section and can produce all grades of washed sand and gravel. Equipment includes a cableway excavator, crusher, screens, etc. The plant is owned by W. P. Penry and W. G. Penry and will be under the supervision of O. W. Kinnamon. The Penry Stone Co. at Radnor, O., is owned by the same men.

Many Features of N. R. A. Are to Be Perpetuated

Industry was told by President Roosevelt, through the medium of his Aug. 24 press conference—his last before leaving for his Hyde Park home—that legislation is now in process which will perpetuate many features of the National Industrial Recovery Act.

The act expires by its own terms June 16, 1935, and no effort will be made to continue it on the statute books, as such. Child labor, minimum wages and maximum hours, as well as some of the fair-trade-practice provisions, are almost certain to be made permanent, assuming that the President continues to exercise the power over Congress that he wielded in the 73rd session. The next two or three months will be given over to a study of this legislation, with Gen. Hugh S. Johnson, Labor Secretary Frances Perkins and Donald Richberg, legal light No. 1 of the Administration playing the important roles.

The anti-trust laws appear likely to be the subject of attempted re-alignment to allow price fixing when declared emergencies exist. This will probably be the most controversial point in the legislative program.

Addition to Illinois Stone Plant Completed

★ The Columbia Quarry Co., St. Louis, Mo., is reported to have completed the expansion and improvement of the crushed stone plant at Chester, Ill. Screens, elevators, bins, etc., have been installed. Crushed stone, agstone, riprap and other limestone products are being produced. Stone is hauled from quarry to plant by truck and power for plant operation is generated.

Concrete Industry's Code Provisions Hold

NO EXEMPTION IN SMALL TOWNS

The ready-mixed-concrete industry is not among the purely local enterprises which are exempted "at this time" from the provisions of their N.R.A. codes, Gen. Hugh S. Johnson emphasized in an administrative order increasing the number of trades to which compacts are no longer applicable in towns of 2,500 persons, or less.

Under an executive order signed by President Roosevelt May 15, Gen. Johnson was empowered to relieve service industries and retail groups from compliance with approved codes. On May 26 the Administrator exempted several, and during the second week of August he added a number of others so that the complete list now includes the following: Baking, in so far as the sale of bakers products at retail is covered; motor-vehicle storage and parking; retail food and grocery; retail jewelry; retail tobacco; retail trade, including drug and bookselling trades; barber shop; bowling and billiard operating; cleaning and dyeing; laundry; real estate brokerage; shoe rebuilders; hotel; restaurant.

The exemption is not total, however, since the employers are still bound by child-labor provisions and fair-trade-practice sections, except those which relate to minimum prices. It extends also only to employers operating three or four establishments, each of which is in a town of 2,500 population. Ordinarily the population of a town will be determined by the Federal Census of 1930. However, upon application to an N.R.A. state director and upon proof satisfactory to him that a town has a different population from that recorded in the Federal Census, the state director may determine whether the town has a population greater or less than 2,500.

Gen. Johnson has ruled that an employer exempted by the order "is not required to comply with the provisions of approved codes which prescribe maximum hours of employment, hours of store operation and minimum rates of pay, or which require the posting of such provisions, or which relate to the minimum price at which the employer may sell merchandise or render a service, or which call for assessments to code authority for the purpose of meeting its expense."

"Attention is called to the fact that the purpose of the order as expressed therein by President Roosevelt, is to 'relieve small business enterprises in small towns from fixed obligations which might impose exceptional hardship,' and that he expects all such enterprises 'to conform to the fullest extent possible with the requirements which otherwise would be obligatory on them,'" said the Administrator in announcing the additional exemptions.

Gen. Johnson has the power further to increase the list of exempted industries at any time.

Lowest Reasonable Cost Defined by N. R. A.

GIVE TENTATIVE INSTRUCTIONS

The announcement by the N.R.A. of an experimental definition of "destructive price-cutting" makes the phrase "lowest reasonable cost" understandable. "Lowest reasonable cost" is not a figure; it is a point on a scale, the scale in each case being the range of costs in the particular industry or for the particular product. Only in specific cases can amounts be used. In general it is necessary to find a formula by which that point on the scale may be determined.

A perfect formula can not be worked out theoretically. It will require close study of a number of tentative experimental formulas. But it is hoped the following definition will prove to be a guide:

"Lowest reasonable cost" is defined for the purposes hereof, as follows:

(a) The figure must neither be high enough to result in fixing price nor to cut off normal existing price competition.

(b) The figure must be within the range of the lowest "costs" (as defined below), which means costs of the group of producers believed by the Administrator to be the most efficient.

(c) The figure fixed must be "reasonable," which means (a) that costs which, due to freakish or extraordinary advantages not available to all such efficient producers, are even less than those of the other most efficient concerns in the industry must be left out of consideration, and (b) that the figure is not rigidly limited to the actual costs of any particular concern.

(d) The "costs" of such efficient concerns, for purposes hereof, include actual necessary outlay found by the Administrator to be directly required in the production and sale of the product or service, including his finding of an amount deemed proper and reasonable on account of maintenance and allocation of actual overhead on the basis of his finding of fullest normal load factor. Interest and return on capital investment are among the items excluded.

Industry is asking two vitual questions: "When is price-cutting destructive?" and "At what point does a price-cutter become a code violator, subject to restraint at the hands of the law?"

The N.R.A. will develop rules and regulations that will provide the final answers to industry's questions, but in the meantime has evolved the foregoing tentative instructions for its guidance.

An industry member is selling his goods or his services at a price described by his competitors as destructive. From now on the procedure in such a case is clear. The range of costs of the industry of which he is a part will be graphed. There will be one point which will be established as the lowest reasonable cost for that industry. It will not cut off competition or tend to fix prices. It will be a point at which the efficient members of the industry can produce. It will not be based on extraordinary circumstances true only in the case of one or two producers, but will take into consideration the circumstances of all the efficient members of the industry. It will be based on a study of figures obtained for such efficient concerns as to their actual cost of production or service, actual cost of maintenance, and allocation of overhead under normal conditions. It specifically does not include interest and return on capital investment.

In this fashion a point on the scale is found, for example, say it is $4.75. Now we turn to the offending member. If his price is $4.50, he is presumably guilty of destructive price-cutting. If his price is $5, the other members of the industry must face the fact that they have a management job to do.

In this experimental stage, however, without sufficient precedent to indicate where a fair, reasonable, and effective course of action lies, it is essential that industry understand and appreciate the absolute necessity of the exercise of practical judgment on the part of the Administrator.

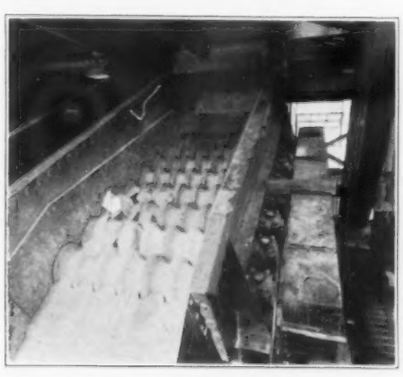
There will always be a few who demand treatment identical with that given another case without regard to difference of conditions. It is still true that one man's meat may be another man's poison.

A decision against a price-cutter in one industry might prevent a price war. The same decision against a member of another industry might very well create a situation far from the purpose and resolve of the recovery act.

The N.R.A. reserves the right of judging on all the evidence, but in line with the instructions for finding lowest reasonable cost, decisions will tend to become more and more uniform.

Michigan Plant Installs Large Live-Roll Grizzly

★ The Inland Lime & Stone Co., Manistique, Mich., recently purchased from the Stephens-Adamson Mfg. Co., Aurora, Ill., one of the largest live-roll grizzlies ever made by that company. The grizzly consists of five cast-steel rolls, 24-in. in diameter, each successive roll driven at an increased speed by means of enclosed Diamond chain drives. The chain drives are totally enclosed and lubricated by positive circulation of oil.



Live-roll grizzly installed in Michigan stone plant.

Concrete Mixer Dues Are Cut by Association

INCREASED MEMBERSHIP GOAL

A strong plea for new members in the National Ready Mixed Concrete Assn. was recently made to all ready-mixed-concrete manufacturers by its president, H. F. Thomson. Feeling that the former schedule of membership dues, ranging from $50 to $300 annually, may in some cases have constituted an obstacle to the growth of its membership, the association has decided on a drastic revision of its dues, which, effective on July 1 of this year, have been reduced to $15 annually for all classes of membership.

In explanation of this radical change in the plan of providing financial support for the organization Mr. Thomson said in part:

"Realizing the added burden of expense on members of the industry incident to the administration of the code, the Board of Directors of the association . . . has arrived at the conclusion that, under present circumstances, the industry is not prepared to support a paid executive staff, and that the association can best serve the interests of the members of the industry by a general coöperation in the actual work, rather than by only providing means for carrying on the work."

The new rate will make possible, says Mr. Thomson, "the distribution of information, contacts with technical committees, the holding of annual meetings, and many other activities. Since these funds are not sufficient to support an executive staff, it is now proposed that the association will function primarily through voluntary committees."

Oklahoma Rock Asphalt Plant Now in Operation

★ A new rock asphalt plant has just been completed at Ada, Okla., by Harry Barndollar and H. H. Hanenkratt and is ready for production. The usual methods of quarrying, crushing and screening are used but it is claimed that the material requires no admixtures before it can be used. Mr. Hanenkratt was for many years a road contractor and Mr. Barndollar formerly operated a similar plant in southwestern Missouri.

New Temporary Cement Code Authority Member

The Administrator of the N.R.A. has approved the appointment of John F. Neylan, assistant general sales manager, International Cement Corp., New York, N. Y., to serve on the cement industry's Code Authority during the absence of Charles L. Hogan, president of that company.

New Policies Govern NRA Hours and Costs

CUSTOMERS GROUPING COVERED

The National Recovery Administration has announced the determination of three policies of interest both to industries operating under approved codes and those whose codes are now awaiting approval. The announcement is coupled with reiteration of recent assurances that application of the new policies to already-approved codes is not to be arbitrary and need not be expected unless the impracticability of inconsistent code provisions has been demonstrated by experience. As heretofore, codes awaiting approval, if they are otherwise acceptable, will be approved and only the flatly-inconsistent provisions will be stayed until the affected industry has had an opportunity to show the necessity for a variation from the now established policy.

Most important of the three policies announced is that which drastically modifies the practice of averaging maximum work hours over periods of weeks or months. The latter plan, designed to provide sufficient flexibility for peak demands and labor shortages, has proved unsatisfactory in operation. Such provisions, frequently misinterpreted, have caused controversies and have proved difficult to enforce.

Hereafter the use of averages will be limited in conformity with the following:

Averaging in provisions governing hours of work has in practice proved unsatisfactory. Conditions which would otherwise give rise to the use of averages should hereafter be dealt with in conformity with the following policy:

To the extent that it is impracticable to provide an inflexible maximum-hours limitation, in view of peculiar seasonal or other needs of an industry, a stated maximum with a proviso for a definite tolerance (on a weekly or daily basis) may be provided. To penalize abuse the payment of overtime for hours worked in excess of the stated maximum, but within the tolerance, should be required. Where a definite tolerance is not sufficient, particular defined circumstances (such as emergency maintenance and repair) may justify unlimited tolerance, with payment of overtime for all time in excess of the maximum.

Another problem, that of the classification of customers, which has troubled both the N.R.A. and industries operating under codes, may be solved by provisions now suggested to code authorities for inclusion in codes, but which, it is emphasized, are not mandatory. Experience has shown that in many cases proposals by industries for mandatory classification of customers involve attempts to exclude certain types of distributors from distribution of the product. The recommended provisions would require code authorities to make up and keep current a classification of all types of customers of their industries, with a complete definition of each class in terms of functions or as purchasers of defined quantities. The right to classify his own customers in accordance with his own judgment is reserved to each individual member of the industry, but in the light of knowledge of the official classifications presumably used by his competitors.

The following clause reflects N.R.A. policy on this matter, and should be substantially followed wherever provisions for classification of customers are included in codes:

"The Code Authority shall cause to be formulated and keep current a classification of all types of customers of the industry. Such classification shall be subject to the disapproval of the Administrator and shall contain: (a) A complete list of all the classes of customers of the industry, including a class to cover every known type of customer, and (b) definitions or descriptions of the several classes in terms of functions performed, or in other appropriate terms such as purchasers of defined quantities.

"After submission to the Administrator, if there is no disapproval or request for suspension of action within 20 days, full information concerning the classification shall be made available to all members of the industry. No one shall, by intimidation, coercion, or other undue influence, cause or attempt to cause the inclusion of any customer in or the exclusion of any customer from any class of customers from the classification, the use of uniform or stipulated prices, discount, or differentials, and each member of the industry may at all times classify his own customers in accordance with his own judgment."

No such proposed code provision, nor any classification thereunder, shall be approved if the same is designed or would tend to fix uniform prices, discounts, or differentials, or to establish resale price maintenance, eliminate or suppress, or discriminate against any customer or class of customers. Other proposed provisions concerning classification of customers are presumed to be contrary to policy.

In a third memorandum it is announced that N.R.A. policy favors "cost or market, whichever is lower," as the normal basis for valuation of materials wherever they appear in the cost formulas which have been provided in approved codes. This policy has been adopted instead of either "market" or "cost" to avoid the evils of provisions which require artificial mandatory profits to those who have accumulated inventories at low prices and to avoid the necessity of shifting the formula for cost from time to time to the basis which is at the moment most favorable to industry, in view of current market conditions.

Eastern Stone Producer Adds Bituminizing Plant

★ The Chambersburg Stone Co., Chambersburg, Pa., has completed the installation at its quarry of a bituminous mixing plant made by the Barber Asphalt Co., Buffalo, N. Y.

153 Aggregate Producers Registered in Region 11

According to the latest information available, 153 producers have registered under the aggregates code (No. 109) in Region 11 (Minnesota. North Dakota and South Dakota). In Minnesota there are 95, in North Dakota 13, and in South Dakota 45.

Must File Prices in Open-Price Districts

N.R.A. LEGAL DIVISION SO RULES

All aggregates producers doing business in districts wherein the open-price policy has been adopted must file their prices, terms and conditions of sale with their District Committees, according to a ruling by the Legal Division of the N.R.A. This applies "even though such sales may be made in accordance with the provisions of term-requirement contracts entered into prior to the effective date of the adoption of the 'open-price policy' within the district."

This ruling removes the confusion that arose in some districts because of the failure of the industry's code (No. 109) to require such a filing of prices or to cloak the district committees with authority to require it. This decision is in conformity with the opinion of the industry's Code Authority, which, as Otho M. Graves, its chairman, explains it, has taken the position that "the prices, terms and conditions of sale of term-requirement contracts should be filed with the District Committee in order that all other producers selling within the district might have complete information at their disposal in conforming with those provisions of the code which preserve the right of all producers to meet competition."

Cement Plant Improves Raw Grinding Division

★ The Alpha Portland Cement Co., Cementon, N. Y., has purchased and installed a Sturtevant Mill Co. 16-ft. mechanical air separator to work in conjunction with the new Babcock & Wilcox Type B mill used for raw-grinding in this plant.

Few Violations Reported by Lime Code Authority

The Code Authority of the lime industry has reported that during the first year of operation of the National Recovery Administration only 19 *bona fide* complaints of violation of the lime code (No. 31) had been filed with the industry's code authority or its National Trade Practice Complaints Committee. Twelve of these complaints have either been adjusted satisfactorily or have been found groundless. Of the 7 complaints still on hand early in August, 4 have been filed with the N.R.A. for final disposition.

The first fatality on the Norris Dam project at Norris, Tenn., occurred August 16 when Fred H. Brooks, an oiler, was crushed between the pulley and the headframe of the belt conveyor from the primary to the secondary crusher.

Housing Program Not Based on Cut Prices

INDUSTRY MUST MAKE PROFIT

Housing Administrator James A. Moffett has given encouragement to producers of building materials by rejecting the proposition that the home-modernization program should be conditioned upon sharp cuts in market prices for these goods. Said Mr. Moffet:

"Surely, if industry generally is operating with little, if any, profit, it is not in a position to make radical reductions in prices. I see no reason why repairs, improvements and modernization, and the building of new houses, should be done without a fair profit to industry. We shall not lend ourselves to any drive to force industries to chisel on their wages or go bankrupt.

"Taking the matter as a straight business proposition, if a general improvement in business is to occur as a result of the increase in modernization and repair work and in the construction of new homes, and if industry is to make fair profits, a general advance in price levels is to be expected."

West Virginia Permissive Area Being Considered

Producers in West Virginia attended a meeting in Charleston on Aug. 31 to consider the adoption of suggested "permissive" areas for operation under the aggregates code (No. 109). The following areas have been proposed:

No. 1.—Wayne, Cabell, Lincoln, Logan, Mingo, Boone, Kanawha and Putnam Counties and a part of Jackson County.

No. 2.—The rest of Jackson County, and Wood and Pleasant Counties.

No. 3.—Tyler, Wetzel, Marshall, Ohio, Brooke and Hancock Counties.

No. 4.—Monongalia, Marion, Taylor, Preston, Tucker and Randolph Counties.

No. 5.—Morgan, Berkeley and Jefferson Counties.

No. 6.—Greenbrier, Summers, Monroe and Mercer Counties.

Utah Permissive Area Submitted to N.R.A.

The National Recovery Administrator is now considering the "permissive" areas proposed by the Utah State Committee of the aggregates industries. The committee has asked for an area including Salt Lake City and its immediate environs, as reported on p. 24 of PIT AND QUARRY for July, 1934.

Technical Advisors Busy on Aggregate Code Work

The Technical Advisory Staff of the Code Authority of the mineral aggregates industries numbers among its members the heads of the engineering and research divisions of the three aggregates associations. This staff is charged primarily with the work of collecting and analyzing statistics and also steers State Committee Reports through their preparation and presentation before the Administration. Work is now under way on the distribution of questionnaires to the mineral aggregates industry for the purpose of collecting data on wages, hours of work, selling price, shipping distances, sales, production, etc., necessary in the further development of Administration policies.

It is reported that only four permissive area reports have been transmitted to the Administration to date, of which two, California and Colorado, have been approved. Twenty-eight other states are reported to be showing some activity in the preparation of reports and preliminary drafts.

Districts of Region 11 are Given New Numbers

The districts of Region 11 (Minnesota, North Dakota and South Dakota) under the aggregates code (No. 109) have been renumbered. Districts 1 to 5 (Minnesota) retain their original numbers (their boundaries are given on p. 60 of PIT AND QUARRY for January, 1934), old Districts 1 and 2 of South Dakota are now known as District 6 (that part east of Missouri River) and District 7 (that part west of Missouri River); and old District 1 of North Dakota (which was the entire state) is now District 8. The boundaries have not been changed.

Gypsum Code Authority is Approved by N.R.A.

The proposed Code Authority of the gypsum industry has been approved by the N.R.A. Its members are as follows:

M. H. Baker, National Gypsum Co., Buffalo, N. Y.

J. C. Best, Best Bros.' Keene's Cement Co., Medicine Lodge, Kan.

Arthur R. Black, Port Clinton, O.

C. O. Brown, Certainteed Products Corp., New York, N. Y.

O. J. Campbell, New York, N. Y.

T. P. Eldred, Utica, N. Y.

S. M. Gloyd, Texas Cement Plaster Co., Oklahoma City, Okla.

R. B. Henderson, San Francisco, Cal.

C. F. Henning, United States Gypsum Co., Chicago, Ill.

Eugene Holland, Chicago, Ill.

James Leenhouts, Grand Rapids Plaster Co., Grand Rapids, Mich.

L. I. Neale, Atlantic Gypsum Products Co., New York, N. Y.

George N. Lenci, New York, N. Y.

Oregon Gravel Plant to be Moved and Enlarged

John R. Dickson of Portland, Ore., is reported to have purchased the old plant of the Independence Sand & Gravel Co., Independence, Ore. The plant is to be removed to a new location and entirely rebuilt along modern lines with facilities for crushing and screening. A contract for material for construction work has already been secured.

Convention of Road Builders Next January

EXHIBIT A PROMINENT FEATURE

The American Road Builders' Assn. announces that it will hold its 1935 convention and highway exhibit in Washington, January 8-11. Convention headquarters will be at the Willard Hotel. An adequate highway program based upon securing financial aid through federal and state sources, giving especial attention to the use of highway revenues for highway purposes and principally the non-diversion of the gasoline taxes and motor license revenues for purposes other than highway construction and maintenance will be the theme of the convention.

Capt. H. C. Whitehurst, president of the association is quoted as follows: "In the past few years the diversion of highway revenues has reached alarming proportions and threatens to stagnate highway construction and maintenance, which in turn will result in a serious impediment to progress in our transportation system. More than $100,000,000 of gasoline taxes were diverted in 1933 and it is estimated that another $100,000,000 was lost by evasion. The backbone of the highway construction for the next few years will depend upon Federal and State appropriations, and the method of extending recently passed Federal legislation into the many states will be given careful consideration."

This Convention and Exhibit will be of particular interest because highway construction has had such an important part in the National Recovery Program. It is recognized as a capital investment and is an activity which puts more men to work in a shorter time than any other. The Convention will bring together thousands of the leading highway officials, engineers, contractors, equipment distributors, producers and manufacturers from all parts of the country for the purpose of discussing ways and means of continuing an adequate highway program.

A number of prominent men who are playing an important part in the continuation of the highway program will take part in the convention proceedings. At the annual banquet the future outline of the Federal and State highway program will be presented by a speaker of national reputation, it is announced.

The divisions of the American Road Builders' Association which will meet at the time of the Convention are: County Highway Officials, City Officials, Contractors, Highway Equipment and Manufacturers, and the Engineers and Officials, the latter membership including representatives from more than 40 state highway departments.

Editorials

Price-Cutting for Government

THOSE who had hoped to be able to give unstinted support to every one of the government's policies have recently been embarrassed by the administration's attitude toward government purchases, particularly in regard to the permission granted to make a 15-per cent. reduction in the prices quoted to various political units. In the simplicity of their partisan enthusiasm they had confidently expected that there would be no need for apologetics, that the administration's plans would prove to be above criticism. They are accordingly finding it difficult, if not impossible, to justify "chiseling" on the part of a government that has adopted every means within its newly-acquired powers to eradicate that practice from private industry.

The spectacle of code formulation and code compliance which most of us have witnessed within the last year has been inspiring. The spirit of coöperation, general forbearance and concession shown by business men in all lines of industry in these new phases of their work has revived in many people—and in thousands of business men themselves—a waning faith in the friendly intentions of human nature. The capacity they have shown for intelligent action, when the fears of price-cutting competition have been dissipated, has given everyone reason to expect great and permanent gains from the trials through which they have passed.

The abolition of price-cutting, like that of child labor, is one of those objectives which all right-thinking men sought to attain, but were seemingly powerless to achieve acting individually. Under the guidance of the government and the levelling effects of the National Industrial Recovery Act a reasonably satisfactory degree of compliance has been accomplished in the matter of price stabilization and business men generally are pleased with the results and hopeful of the future. Yet much of this advance has been put in jeopardy by the government's decision to countenance price-cutting when it and its subdivisions are the buyers. In many cases, where confidence in the government's policies has rested on very weak foundations, the dismay which the now famous 15-per cent. order has created will all but wipe away those frail supports. It has seemed to be—and, indeed, is—inexplicable that the government, which has decided to act as moral guide and not-always-gentle persuader in leading business forward to the adoption of better practices, should itself become a party to one of the most widely condemned of all business practices by seeking for itself and for states, counties and municipalities benefits which are not open to private purchasers.

We hold the adoption of this policy to be more than inexplicable; it is indefensible. It is true that the government did not exact from industry a pledge to eliminate price-cutting, but it did approve scores of codes of fair competition in which the type of price-cutting that had almost destroyed the profit structure of business was condemned and made subject to penalty. In so doing it lent the weight of its idealism, as expressed in the recovery act and the policies adopted under it, and the support of its moral sanction to the policy of price maintenance at profit-making levels, and industry had reason to expect that the government would apply to its own actions the same standards that it had allowed industries to set up for themselves.

Aside from the moral issue involved, one must consider the practical effects of the new policy. It has been argued that the elimination of the sales expense incident to competitive selling to private purchasers has effected a saving greater than the 15-per cent. reduction now applicable to government purchases, but this is a contention which will not bear examination. Nearly everyone who has shared in government business has found the resulting profits, when there were any, less than those commonly realized in ordinary private sales. The delays which attend the filing and consideration of bids, the revisions in specifications due to changes in plans, the inflexible procedure which must be followed meticulously, the delivery-date penalties that are so often attached to orders—all these factors nearly always lower the profits to points below the normal levels of private sales. Even the credit standing of the government, its huge purchasing power and the fact that it is always certain to buy somebody's products do not often offset the excessive cost of the obstacles mentioned.

In seeking for itself advantages which the average private buyer does not ordinarily possess—and which compliance on the part of sellers with the price-maintenance provisions of their codes makes it virtually impossible for him to attain—the government has not made friends for its policies, nor has it increased the national stock of confidence in the integrity of its purposes. In view of its altruistic aims, and in view also of its insistence that these aims be accepted by businesses which are not founded for altruistic ends, business men have a right to expect different standards of dealing on the part of their government and it will be advisable not to disappoint these expectations at a time when the support of industrial opinion is needed. The government has succeeded, through the adoption of policies which have brought the promised results in spite of grave and widespread doubts, in winning an astonishingly wide scale of acceptance of its plans and compliance with its requests. This is a form of support that it knows only too well is not

easily won and is even more difficult to sustain, and if it has proper regard for the future results of its program it will not trifle with the good-will which has been such a powerful factor in maintaining confidence. It will do well to consider at once whether it is not more prudent to countermand the 15-per cent. order, even at the risk of admitting error, than to continue a policy that is inconsistent with its aims, unfair to those from whom it expects to buy, and certain to weaken a confidence that, although general, is not universal and which, once destroyed, may not be recreated.

Trade-Association Usefulness

AS was to have been expected, the concentration of most business men's attention on codes of fair competition has left little opportunity for considering and appreciating the continuing importance of their trade associations. To some of them it has seemed unnecessary to maintain these organizations, now that their codes have set up such complete schemes of self-regulation and have accomplished such striking results in mitigating or eliminating the evils that formerly beset them. Almost overnight, it might be said, many of their associations' objectives have been attained and there has followed a natural lagging of interest in trade-association problems and activities. The costs of code administration, although not exorbitant in most cases, made trade-association support seem to be a needless expense.

N. R. A. codes have temporarily overshadowed, but they have not removed, the necessity for strong trade organizations. They have, it is true, accomplished in a short time much of the work which industrial associations had marked out as their natural aims, and they have also assumed control of some problems—such as the hours and wages of labor—with which few trade associations concerned themselves. They have not, however, touched many of the most important activities of existing trade organizations, such as research and engineering developments, statistical study, competitive relations with other industries and their products, winning acceptance of their own products and discovering and opening new markets for them. In such problems the work of the trade association is never done, and certainly the codes approved by the National Recovery Administration provide no substitute machinery for solving them.

In recognition of the added financial burdens placed upon business men by the costs of code administration some trade associations have adjusted their scales of dues to meet the new conditions. As an example, the case of the National Ready-Mixed Concrete Association may be cited. Dues, which formerly amounted in some instances to as much as $300 annually according to the volume of production, have been reduced to $15 a year, a flat rate which applies to all members irrespective of output. This startling economy has been made possible by eliminating the paid executive staff, whose duties will be discharged by committees chosen from the membership. It is realized that the experience gained by many members, through their having served in various capacities in formulating and administering their industry's code, has awakened in them a new and stronger sense of industrial responsibility and a desire to contribute to the preservation and development of their industry. At the same time it has fitted them, probably as no other experience could have done, for viewing trade-association work in a new light and for serving their industry, as well as themselves individually, with new capacity and new confidence.

Trade associations which have shown themselves capable of harmonizing the differences that formerly existed between competitors within the industries they serve, of developing between these natural rivals a proper sense of industrial solidarity and mutual respect, and of accomplishing immediate, practical and lasting results for all will continue to merit and receive the support of those who understand the problems of their industries and the ability of well-administered trade associations to solve them. Instead of becoming weaker in view of N. R. A. code operations, good trade associations should gain strength. Before them in many cases lies more important work than any they have ever undertaken and with some of their objectives already attained, or advanced a long way toward attainment, through the N. R. A. they will have the opportunity of concentrating a greater share of their efforts toward the attainment of those that remain and are yet to be developed.

As is well known, the N. R. A. is striving to attain a simplification of the existing code system by which it will be possible to consolidate codes and place industries naturally allied or inevitably competitive under single codes that will equate, as far as is feasible, the more striking differences between present codes. As this policy becomes increasingly effective, the indispensability to each industry of an individual trade association, able to deal with the problems peculiar to it, will become more evident to those industrialists who remain outside the organizations that have done so much for them but have been forced to get along without their financial assistance. The consolidation sought for, however desirable it may be, will raise new problems for each of the industries involved and these can be solved best by the coördinated effort and group consciousness which trade associations create.

Should the N. R. A. not become a permanent feature of government, its present duties and such of its policies as prove to be worthy of retention will probably, and certainly very naturally, devolve upon trade associations and thus add to their importance, prestige and responsibilites. It was always true that no business man who took a serious, long-range view of his opportunities should have remained outside the membership of his trade association. Today, especially under such favorable terms as those mentioned, he can scarcely afford to withhold his support. All worth-while trade associations should be able to point to growing lists of members as the importance of their work becomes evident to those on whose support they have so just a claim.

Insurance Policies Cover Silicosis and Other Occupational Diseases

Carrier's Attempts to Escape Payment by Denial of Liability Not Justified

By H. R. NORTHRUP

MUCH has been printed and said regarding the legal, medical and preventive aspects of occupational diseases. Quarry operators, cement manufacturers and others engaged in similar industries subject to claims for silicosis and other diseases have heard little about the all-important insurance phase of this subject. The little they have heard during the last few years has been a curt statement of their insurance carriers, "Our policy does not cover this claim." In some cases the carrier has had the employer sign a "Reservation of Rights Agreement"—an agreement of which producers should beware.

This article has to do with *common-law occupational-disease* claims made against employers in states having workmen's compensation laws but which do not include diseases within the provisions of their acts.

Most of these common-law occupational-disease claims, legitimate or otherwise, are covered under the insurance policies of past years. That is, the employers are fully protected against such claims if the employee alleges that the *disease was contracted during past years.*

The policy sold by the insurance companies contained a promise to pay legitimate claims and to fight "faked" claims. The insurance companies honored these promises for many years and raised no question regarding their legal responsibility. Then came the depression. The number of common-law claims, both fair and "faked," increased tremendously. Actual pending claims throughout the United States now amount to many hundreds of millions of dollars. The insurance companies have become panicky. Instead of fighting "faked" claims and paying the fair, they have decided to refuse any longer to recognize responsibility for such cases. That this violation of their contracts with employers will bankrupt many concerns does not matter. The fact that the employers have paid for this protection apparently carries little weight in the decision to deny liability.

The main question was to find some clause in the policy which would make possible an evasion of this responsibility. Clause No. 7 of the standard policy contains some ambiguous words and this has been seized upon. While responsible insurance-company executives are fully aware that this particular clause was never intended to limit the policy coverage, it furnishes a basis of denial of responsibility that sounds quite respectable and plausible to those not familiar with how insurance rates are made and what these rates are intended to cover. So plausible sounding is the insurance companies' argument that high courts in two states have handed down decisions in favor of the carriers. Able attorneys not conversant with the facts have, after listening to the insurance-company lawyer or claim adjuster, told the employer that the policy does not cover this type of case.

Employers operating in states in which these diseases are covered by workmen's compensation acts are not particularly concerned with the insurance aspect. These states are few, however. Claims likely to be made against quarries, cement plants and similar industries are included under the compensation acts of California, Connecticut, Massachusetts, North Dakota and Wisconsin. A recent North Carolina court decision brings certain cases in that state under its workmen's compensation act. Under a recent amendment employers may bring silicosis within the provisions of the Kentucky Workmen's Compensation Act. Missouri employers may bring diseases under the workmen's compensation law under certain conditions, but too few have taken this desirable step. Even in states whose compensation laws have included disease cases for some time, there is the possibility of common-law claims being made.

Strange as it may seem, while the policies of former years did not mention occupational diseases, they really fully protected the employer against this type of claim, whereas the policies now being sold with the so-called "inclusion" of occupational disease coverage do not protect the employer against claims which will be made under them.

THE author's experience with insurance matters extends back some twenty-six years, during the first ten of which he was employed by two large New Jersey manufacturers on employees' liability and workmen's compensation problems under the first workmen's compensation law enacted in this country. Following this he was engaged in inspection work for the insurance companies' rating bureaus in New Jersey, Iowa, Nebraska, Texas, Illinois, Indiana and Missouri. For the next nine years he was in charge of the Missouri Rating Bureau for liability and workmen's compensation insurance companies. Since 1928 he has served as insurance advisor to the Members of the Associated Industries of Missouri, representing the association at insurance-rate hearings and before committees of the legislature.

To present the facts properly with copies of valuable official records would require a good-sized volume. In the space available here only the most important points will be covered. Technical arguments and references to many official records having a direct bearing on the issue must necessarily be omitted.

Most insurance companies use what is known as the "Standard Workmen's Compensation and Employers' Liability Policy." Five years ago I asked the leading insurance companies using this standard form of policy how each construed it with respect to coverage against common-law occupational-disease claims. This investigation was made in connection with the policies issued to employers in a mid-western state but the situation in this particular state is no different from that in all the others.

Many replied to the effect that the policy unquestionably covered the employer against all such claims. Some said that they did not know whether the policy was intended to cover such cases. Others stated that they reserved the right to pass upon each individual case after the claim was made. (This latter procedure would create an ideal situation for the carrier but one most unsatisfactory for the employer insured in such a company.) A very limited number stated that in their opinion the policy did not cover this type of claim. The only one in this group still in existence and which writes any considerable volume of business later informed me that it would construe the policy to cover such cases in the state referred to. Subsequently this carrier had to admit that if the policy covered in this one state, it would cover in others also.

The insurance companies maintain rating bureaus manned by experts in the science of insurance rate-making. Official records show that these experts many years ago included in the rates they established definite loadings for these common-law occupational-disease claims. These experts, in collaboration with experts in the direct employ of the insurance companies, did not hesitate to load into the rates arbitrary sums in anticipation of possible claims of this type which they knew or believed might be made. Policies issued years ago and by which the insurance companies now say these common-law claims are not covered, it can be proved were loaded in this way for this very type of claim.

The carriers' attitude is indefensible. It is as senseless and unjust as it would be to say that the policy does not cover broken legs, ruptures or any particular type of disability. Simply because the carriers are facing heavy losses due to a large number of a particular type of claim is no excuse for repudiating a contract.

Let us examine the standard form of policy. The punctuation and capital letters are quoted exactly as they appear in the official form. First there appears the name of the insurance carrier, following which comes the insuring clause reading as follows:

> Does Hereby Agree with the Employer, named and described as such in the Declarations forming a part hereof, as respects personal injuries sustained by employees, including death at any time resulting therefrom as follows:

Note that the policy insures against claims for "*personal injuries.*" Nothing is said in the insuring clause about "accidents" or "accidentally sustained."

Following the insuring clause comes Par. 1 (a) under which the insurance carrier agrees to assume all the employer's obligations under the state workmen's compensation act. We are not concerned with this, because no carrier has yet raised any question regarding claims coming under workmen's compensation acts.

Next comes the section of the policy covering all the liability not under the workmen's compensation law. This is designated as Par. 1 (b) and agrees to indemnify the employer against loss by reason of liability imposed upon him by law for damages on account of injuries referred to in the *insuring clause.* Bear in mind that the insuring clause refers to "*personal injuries.*" Up to this point, and for a number of paragraphs that follow, nothing is said about "accidents" or "injuries accidentally sustained."

Considerably farther along in the policy comes Par. 7—some companies using what is otherwise the same form, assign number 6 to this paragraph —which reads as follows:

> This agreement shall apply only to such injuries so sustained by reason of accidents occurring during the Policy Period limited and defined as such in item 2 of said Declarations.

Until a few years ago no carrier seriously contended that Par. 7 of the policy had anything to do with defining the coverage. Coverage is defined at the top of the policy in words so broad that it includes occupational-disease cases without specifically mentioning them as such. They realized that this section was intended to define the period of coverage; the use of capital P for the two words "Policy Period" also indicates this. They now claim that the words "by reason of accidents" appearing in Par. 7 relieves them of responsibility. Their briefs claiming this sound most plausible, but there is overwhelming evidence to prove that the word "accidents" was loosely used to mean "occurrences."

The carriers deny ever loosely using the word "accident" to designate an occupational disease. Official records in various states clearly show that the word has been used time and again by the carriers in referring to occupational diseases. An amusing fact is that long after the carriers commenced their campaign of denying liability on this ground their rate experts continued to use the word "accident" in referring to common-law occupational-disease claims. This was at the same time that the carriers were claiming before courts and state insurance departments that diseases are not accidents and are therefore not covered by their policies.

The expert on contracts who designed this standard policy is on record with me to the effect that it was intended to cover common-law occupational-disease claims.

The spokesman for the stock casualty insurance companies, whose major activity has for years been that of showing the faults of monopolistic state insurance, has appeared before many committees

and commissions proclaiming the virtues of private insurance and the evils of monopolistic state insurance. During one lengthy argument in opposition to a monopolistic workmen's compensation insurance fund being established, he said, according to the official record:

> From the employer's particular standpoint, the advantages of stock-company insurance are as follows:
>
> 1. Protection in a single insurance policy against both the liability for compensation and any possible liability for damages under "employers' liability laws"; in other words, "complete coverage" against all possible liability to employees. The state funds generally insure against compensation only, leaving the employer unprotected against all other liability—of which many instances occur—unless the employer insures also in a private company.

What did this gentleman mean by the statement that the stock insurance companies provide *complete coverage against all possible liability to employees?* He meant just what he said. The companies using this standard form—most stock companies and many mutuals—have for years claimed to protect the employers fully against all claim and until recently did give this protection.

Still another authority, whose long and varied experience qualifies him to speak with more weight than the proponent of stock insurance or even the author of the policy itself, is on record with me that the policy unquestionably covers the employer for the cases we are discussing. His long and somewhat technical letter ends with the following words of sense and truth:

> There will be many, many cases where the courts will rule that the occupational disease complained of is not an injury and that there is no liability on the employer to compensate the employee for the results of such disease. These, of course, will be thrown out, *but the throwing out will be done by the courts rather than by the insurance carriers.* (Italics mine.)

The state of New York operates an insurance fund for employers in competition with private carriers. Less than a year ago this Fund informed me that its policy for years fully covered these common-law claims.

About two years ago the carriers added a special small charge to the rate for every classification because of the increasing number of occupational-disease claims. It was definitely stated that these charges were for common-law occupational-disease losses. For some time this special charge was made without any endorsement on the policy "extending" it to cover occupational diseases because this coverage had always been provided by the standard form. This additional charge, without any change in the policy form, is one of the links in the chain of evidence against the insurance companies.

It was not until some time later that separate and much heavier loadings were put into effect with the provision that if these special loadings were paid, the policy would be endorsed "extending" it to include occupational diseases. If the employer did not want to pay this special loading an endorsement would be attached excluding occupational diseases.

Many of the special loadings just referred to will be justified by later experience. In fact, in many instances the loadings are not sufficient. Employers do not object to paying for coverage given but this so-called "inclusion" endorsement was unnecessary because the policy provides occupational-disease coverage without it. More important than this is the fact that this so-called "inclusion" of occupational-disease endorsement contains a joker which leaves the employer without any protection such as it purports to give, in 95 per cent. of the claims that are made. The joker is found in the provision that the endorsement covers claims *"resulting in occupational incapacity necessitating cessation of work during the policy period."* Most occupational-disease claims and suits allege that the disability of the employee commenced several years after the man left the employment and consequently long after the policy period referred to. Ordinarily these diseases do not require the employee to *cease work during the policy term,* nor do they result in *incapacity* during that time. Only one of the many cases that I have had occasion to review makes allegations of such a nature that the employer would be covered under this endorsement. It should be remembered that most of these common-law occupational-disease claims are made many years after the policy expires. This will not relieve the insurance companies of liability under policies issued years ago, but they will be relieved of liability for such claims under policies to which are attached either the "inclusion" or "exclusion" endorsements referred to above.

Frequently, following a disagreement between the employer and the insurance carrier as to the responsibility of the latter, the carrier has said in effect, "Well, under the New Jersey and Illinois decisions we are not liable for this claim, but we want to do the right thing, therefore, Mr. Employer, if you will sign this 'Reservation of Rights Agreement' we will defend you in this case and determine later whether you or we are liable."

Such an offer by the carrier sounds rather generous to the employer after he has heard its plausible-sounding argument as to why the policy does not cover. Actually, such an attitude of the carrier is entirely to its own advantage. Is it possible that in such cases the carrier hopes to delay payment until a decision in its favor is given in some other case in the same state? Do the carriers hope to establish more precedents by decisions in other states? Do the carriers hope to go into court in the case of some poorly-informed, small or bankrupt employer with the chances strongly in their favor?

A reservation-of-rights agreement and similar devices are sometimes used to keep the employer from pushing his case. It is a sort of sedative, having the effect of temporarily dulling the understanding of the employer as to the importance of watching his interest. It is altogether too likely that when the effects of this potion wear off the employer will have lost his rights.

An employer told me recently that he had just signed a reservation-of-rights agreement in a case which had been reported to the insurance carrier eight months previously. He signed this agreement on the advice of his attorney. This was in a state

(Continued on page 45)

View of dam site taken June 16 shows cofferdam being prepared for concreting. Tail towers of cableways are at extreme left. Pump-house and pipeline in foreground supply water for sand and concrete plants.

T.V.A. Plants Designed for Output of 3,000 Cu. Yd. of Concrete Daily

One Norris Dam Plant Uses Hammer-mills and Classifiers for Making Stone Sand

By W. E. TRAUFFER

THE construction of Norris Dam, the first major engineering undertaking of the Tennessee Valley Authority, is now well under way. Excavation and preliminary work have been practically completed. The pouring of concrete was begun July 17, and, it is expected, will be finished early in 1936. This is the first of a number of dams to be built on the headwaters of Tennessee River. Their chief function will be the regulation of the river flow for navigation and the reduction of flood hazards which have been serious in the past, and the production of hydroëlectric power. Norris Dam is a concrete structure of the gravity type, 1,570 ft. long, 210 ft. thick at the base and 253 ft. high from the foundation to the roadway which will cross the top 40 ft. above the spillway crest. In addition there will be a total of over 800 ft. of earth-fill or core-wall section. A total of nearly 1,000,000 cu.yd. of concrete will be placed.

The Norris Dam site is on Clinch River, 20 mi. northwest of Knoxville, Tenn., and 8 mi. downstream from the confluence of the Powell and Clinch Rivers, the valleys of which will both form storage-basins when the dam is completed. A reservoir extending 79 mi. up Clinch River and 45 mi. up Powell River will impound an expanse of water covering 83 sq. mi. and containing 3,600,000 acre-feet or about a year's normal flow of water. Two generating units of

Semi-trailer being loaded with cement from bin at railroad siding. Portable pumps unload from cars.

Three semi-trailers loaded with cement waiting to discharge into storage silo near concrete-mixing plant.

Removing the overburden from the deposit by hydraulicking.

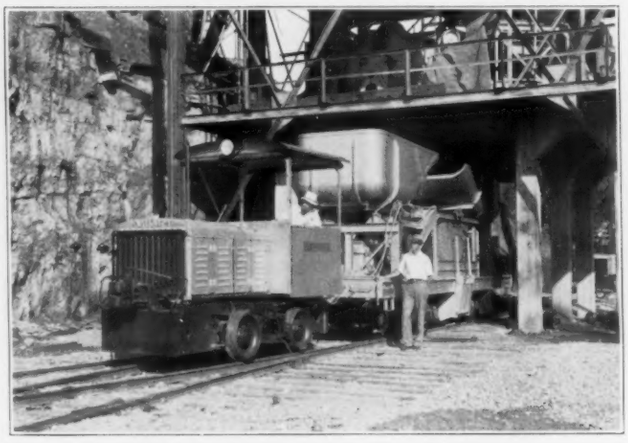
One of the shovels loading stone into motor truck.

Another type of shovel loading stone into motor truck.

66,000 hp.-capacity each will be installed. The original design of the dam included a navigation lock for river traffic, but this has since been eliminated as studies have shown that its cost would not be warranted by commercial traffic along this section of the river.

When preparations were being made for the construction of Norris Dam it was originally intended to construct a railroad from Offut Creek to the dam site. Further investigation, however, revealed a suitable deposit of dolomitic limestone near the dam site located so as to be economically available, and it was decided to build a crushing-and-screening plant to produce the aggregate for the dam. Extensive tests made by the Bureau of Reclamation at Denver, Colo., showed the stone to be entirely satisfactory and the design and construction of the main plant was immediately begun. A temporary plant furnished aggregate for the foundations, footings and tunnel for the main plant, etc., and was dismantled when this work was completed. The main plant, which went into operation July 17, is modern in every detail. Only the best materials and equipment were used and the latest approved methods of operation are employed.

The stone sand produced by the hammer-mills in this plant was thoroughly tested by the Bureau of



One of the gasoline-electric locomotives with special skip car under the concrete-mixing plant.

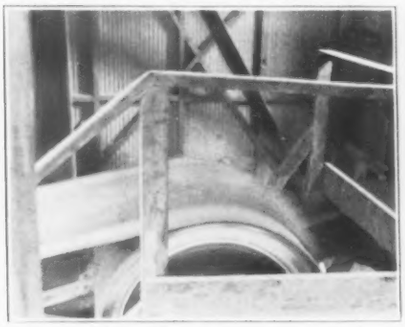
View taken July 31 showing condition of stock-piles at that time. Concrete plant is at extreme left with cement silo visible above. Conveyor at right is from secondary crusher.

Reclamation and found to be superior to local sands, especially in the production of a workable concrete. According to Barton M. Jones, chief engineer, this is due to the cubical shape of the grains. He also stated that the high cost of production of this stone sand is compensated for by an appreciable reduction in the amount of cement required. This gives the added advantage of lower temperatures by lessening the quantity of heat generated by the cement in the concrete. Two sizes of sand, 4- to 8-mesh and 8- to 100-mesh, are being produced and the sand plant is so designed that the minus 100-mesh content of this sand can be satisfactorily controlled.

One of the trucks ready to discharge into primary crusher.

Conveyor feeding the vibrating screen producing 1½- to 3-in. stone.

Cableway bucket which places concrete in dam just after it has been loaded from special skip cars.

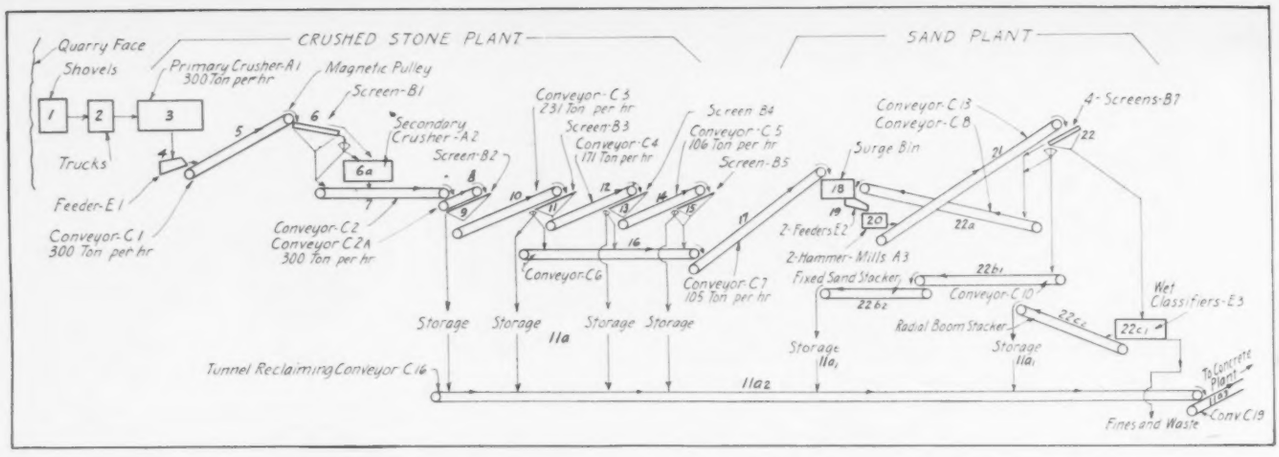


The magnetic head-pulley of the conveyor from the primary crusher.

The design of the plant involved a number of unusual problems as the quarry was on one side-hill of the valley and the plant site paralleling the valley on the other. The primary crusher was placed at the edge of the quarry and the main conveyor spans the valley to the plant. The concrete-mixing plant is at the end of the stone plant and is only a few hundred feet from the cableway which places the concrete.

The plant is designed to allow a certain amount of flexibility in sizing and capacity, but, because of the small number of predetermined sizes of mate-

View of aggregate plant taken July 19 and showing location of reclaiming tunnels. Quarry and conveyor from primary crusher can be seen in right background.



Flow-sheet of Norris Dam crushed-stone and sand plants of the Tennessee Valley Authority.

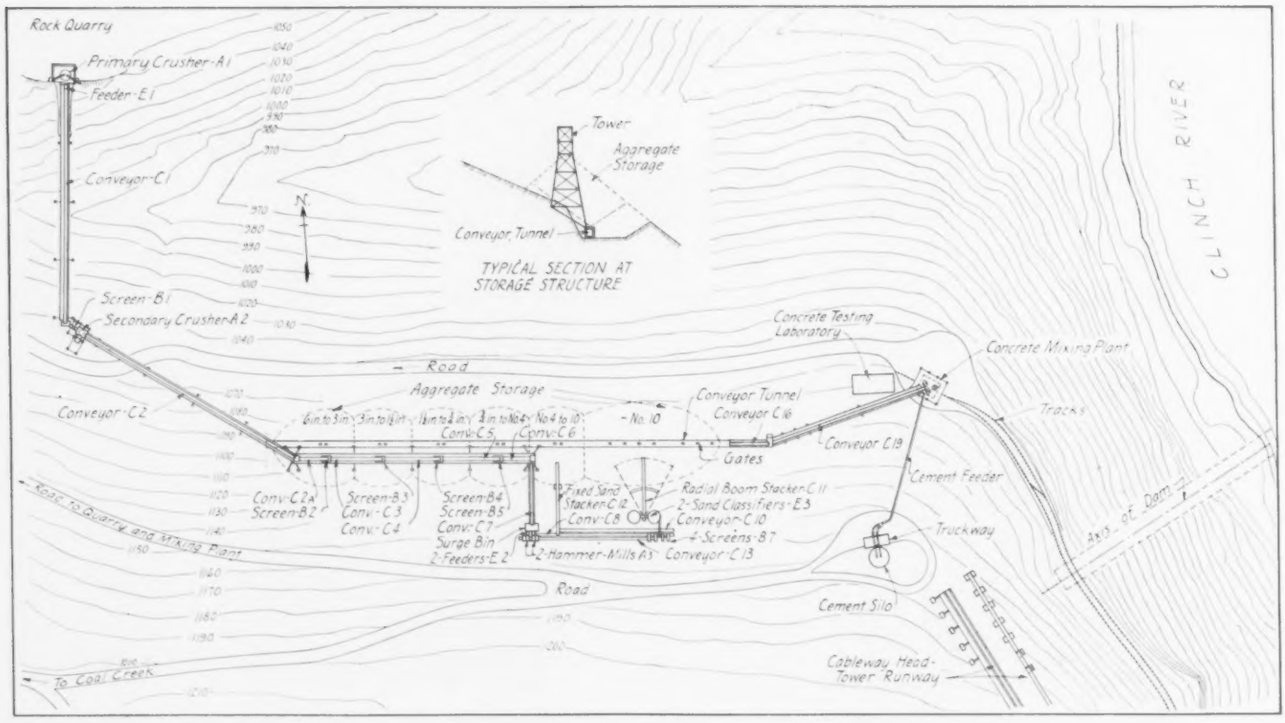
rial to be produced, no reprocessing is necessary as is the case in most large commercial plants. The consumption of stone is to be balanced throughout the entire dam construction. The only variation in sizes required will occur when reinforced concrete is poured. A secondary crusher of sufficient capacity to turn out the required amount of smaller stone for this purpose has been installed.

The structural-steel storage-bridge consists of four 80-ft. spans and a screen in the center of each span. The reclaiming tunnel of concrete is under this bridge and extends beyond it under the sand-stacking conveyors. This tunnel is 646 ft. long and is 6 ft. wide and 6½ ft. high inside. There are 18 openings in the top of this tunnel with gates through which the stock-piled material is drawn upon the conveyor belt. There are two gates under each of the four coarse-aggregate stock-piles and the stored coarse-sand stock-pile and eight under the stored fine sand.

The present storage system has a live capacity of about 24,000 tons, equal to 80 operating hr. of the plant. This is expected to be ample, but if necessary a larger quantity can be stored by installing a drag-scraper on the uphill side. At present one of the Allis-Chalmers tractors, equipped with an Austin-Western "bulldozer," is used for this purpose.

The plant capacity is rated at 300 tons per hr. of all sizes combined, but 25 per cent. in excess of this amount can be produced. The plant is of concrete-and-steel construction throughout.

Stripping of the quarry-site was also begun immediately. Because of the hillside location and adequate drainage hydraulicking was used. The overburden averaged only about 5 ft. in depth, but the steep slope and the irregular surface of the



Plan of the Norris Dam plants and the surrounding terrain, with a typical section of the storage structure (inset).

rock influenced the decision to use this method. Joshua Hendy 2½-in. nozzles were used and water distributed in 12-in. pipe was supplied to the nozzle at 150-lb. pressure by three pumps operating in series. This work was completed July 15 and the pouring of concrete was begun two days later.

The quarry was broached at the 1,060-ft. contour, about 240 ft. above the bed of the river at the dam site. Drilling is being done with Ingersoll-Rand, Gardner-Denver and Worthington wagon drills. The face is being worked in 30-ft. benches and is about 60 ft. high, but a maximum of over 100 ft. is expected. At that time the quarry floor will be lowered another 30 ft., working from the face back toward the crusher, so that the blasting can do no damage.

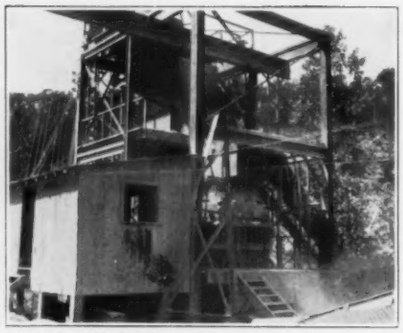
TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE CRUSHED-STONE PLANT OF THE TENNESSEE VALLEY AUTHORITY, NORRIS DAM, TENN.

(Key Numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Power Transmission
Loading and haulage	1	Shovels (2)	Marion Bucyrus-Erie	No. 450, electric No. 75, electric		
	2	Trucks (5)	White (3) Hug (2)	12-cu. yd. end-dump 12-cu. yd. end-dump		
Primary crushing	3	Crusher	Allis-Chalmers	42-in. gyratory	General Electric 250-hp. slip-ring motor	Allis-Chalmers Texrope
Scalping	4	Feeder	Jeffrey-Traylor	36-in. by 5-ft. 6-in. heavy-duty vibrating		
	5	Conveyor No. 1	Robins	36-in. by 334-ft. centers	Westinghouse 60-hp. gearmotor	Jones semi-flexible coupling
		Belt	Manhattan	8-ply, 693-ft.		
		Magnetic pulley	Dings	40-in.		
	6	Screen (To 6a or 7)	Robins	Gyrex 4-ft. by 8½-ft., 2-deck	Century 7½-hp. motor	V-belt
Secondary crushing	6a	Crusher (To 7)	Symons	5½-ft. standard cone	General Electric 200-hp. slip-ring motor	Falk flexible coupling
Stone screening	7	Conveyor No. 2	Robins	30-in., 369-ft. centers	Westinghouse 60-hp. gearmotor	Jones semi-flexible coupling
		Belt	Manhattan	8-ply, 764-ft.		
	8	Conveyor No. 2a	Robins	30-in., 48-ft. centers	Century 10-hp. gearmotor	Falk flexible coupling
		Belt	Hewitt	5-ply, 100-ft.		
	9	Screen	Niagara	4-ft. by 14-ft., 1-deck	Century 5-hp. motor	V-belt
	10	Conveyor No. 3	Robins	24-in., 85-ft. centers	Century 10-hp. gearmotor	Falk flexible coupling
		Belt	Acme	4-ply., 102-ft.		
	11	Screen (Oversize to 16 and /or 11a1, throughs to 12)	Stephens-Adamson	4-ft. by 8-ft., 1-deck	Century 5-hp. motor	V-belt
	12	Conveyor No. 4	Robins	20-in., 92-ft. centers	Century 7½-hp. gearmotor	Falk flexible coupling
		Belt	Acme	4-ply, 187-ft.		
	13	Screen (Oversize to 16 and/or 11a1, throughs to 14)	Stephens-Adamson	5-ft. by 8-ft., 1-deck	Century 3-hp. motor	V-belt
	14	Conveyor No. 5	Robins	18-in., 92-ft. centers	Century 5-hp. gearmotor	Falk flexible coupling
		Belt	Acme	4-ply, 187-ft.		
	15	Screens (2) (Oversize to 16 and /or 11a1, throughs to 16)	Stephens-Adamson	5-ft. by 8-ft., 1-deck	Century 3-hp. motors	V-belt
Sand crushing and classifying		(From 11 and 15)				
	16	Conveyor No. 6	Robins	18-in., 220-ft. centers	Century 5-hp. gearmotor	Falk flexible coupling
		Belt	Acme	4-ply, 445-ft.		
	17	Conveyor No. 7	Robins	18-in., 100-ft. centers	Century 7½-hp. gearmotor	Falk flexible coupling
		Belt	Thermoid	4-ply, 205-ft.		
	18	Surge bin				
	19	Feeders (2)	Jeffrey-Traylor	48-in. by 60-in. heavy-duty vibrating		
	20	Hammer-mills(2)	Allis-Chalmers	42-in. by 48-in. Pulverators	(2) 250-hp. slip-ring motors	Allis-Chalmers coupling, Direct-connected
	21	Conveyor No. 13	Robins	20-in., 198-ft. centers	Century 15-hp. gearmotor	Falk flexible coupling
		Belt	Thermoid	5-ply, 400-ft.		
	22	Screens (4) (Oversize to 22a, intermediate to 22a and /or 22b1, fines to 22c1)	Allis-Chalmers	4-ft. by 10-ft., 2-deck	(2) Allis-Chalmers 3-hp. motors (2) Century 3-hp. motors	V-belt V-belt
Oversize sand re-crushing	22a	Conveyor No. 8 Belt (To 19)	Robins Thermoid	16-in., 195-ft. centers 3-ply, 395-ft.	Century 5-hp. gearmotor	Falk flexible coupling
Coarse sand reclamation		(From 22)				
	22b1	Conveyor No. 10 Belt	Robins Thermoid	16-in., 154-ft. centers 3-ply, 312-ft.	Century 3-hp. gearmotor	Falk flexible coupling
	22b2	Stacker	Barber-Greene	Fixed, 16-in., 98-ft. centers	General Electric 3-hp. gearmotor	Flexible coupling
		Belt (To 11a1)	Diamond			
Fine sand classification and reclamation		(From 22)				
	22c1	Sand washers (2)	Link-Belt	Rotoscoop, 15-ft. diameter	General Electric 15-hp. motor	Coupling-speed reducer-sprocket chain and gears
			Dorr	12-ft. diameter	General Electric 15-hp. gearmotor	Sprocket chain and gears
	22c2	Stacker	Barber-Greene	Radial, 16-in., 85-ft. centers	General Electric 3-hp. gearmotor	Falk flexible coupling
		Belt (To 11a1)	Diamond			
Gravel storage and reclamation		(From 11, 13, 15, 22b2 and 22c2)				
	11a1	Open storage				
	11a2	Conveyor No. 16	Robins	30-in., 573- ft. centers	Westinghouse 30-hp.	Falk speed reducer and Falk flexible coupling
		Belt	Hewitt	5-ply, 1150-ft.		
	11a3	Conveyor No. 19 Belt (To mixing plant)	Link-Belt Manhattan	30-in., 234-ft. centers 8-ply, 522-ft.	Westinghouse 60-hp. gearmotor	Jones semi-flexible coupling

Secondary cone crusher with scalping screen above. Conveyor from primary crusher at right.

The central concrete-mixing plant with aggregate belt-conveyor and cement pipe at left.



Another view showing the scalping screen and the secondary crusher discharging to conveyor.

The stone is badly eroded at the surface to a depth of about 8 ft. and this is blasted separately and wasted to remove the remaining clay and soft rock. Drilling of the 30-ft. bench levels is done with four rows of holes spaced 6 ft. apart and staggered, with an 8 ft. buffer. Atlas 40-per cent. quarry gelatin and Du Pont exploders are used. Jackhammers are used for secondary drilling. An Allis-Chalmers crawler tractor, with an Austin-Western "bulldozer," keeps the quarry floor clean and smooth for the operation of the trucks.

Loading is done by two 3-cu.yd. electric crawler shovels, one a Marion No. 450 and the other a Bucyrus-Erie No. 75, both equipped with Ward-Leonard control. Five motor trucks, two Hugs and three Whites, with 12-cu.yd. end-dump bodies, haul the stone and discharge it at the quarry level direct into the primary crusher. An A-frame and hoist over the crusher is used to clear the crusher and handle its parts. These trucks and a number of Mack dump trucks were used for hauling away excavated rock when the dam foundation was being excavated.

The Allis-Chalmers 42-in. gyratory primary crusher is set to crush to 6 in. minus and discharges

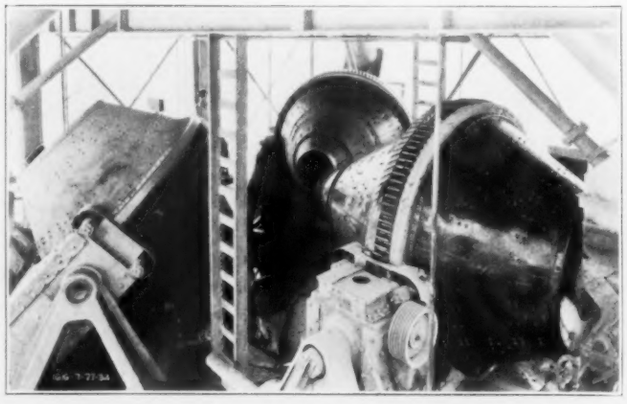
The belt-conveyor which carries aggregate to the top of concrete-mixing plant. Screening and sand plants in background.

by 8-ft. double-deck vibrating scalping screen fitted with 6-in. and 3-in. wire cloth. The oversize stone (6-in. plus) is chuted to the Symons 5½-ft. standard cone secondary crusher which is set to produce 1½-in. minus material. Any desired part of the 3-in. to 6-in. stone can also be diverted to the crusher to keep the sizes balanced to meet requirements. The products of the screen and crusher are recombined on a 30-in. belt-conveyor (No. 2), which carries them to the screening plant where it discharges them on a short 30-in. belt-conveyor (No. 2A).

This conveyor discharges the stone, which is now graded from 6-in. down to dust, on the first sizing screen, a Niagara 4-ft. by 14-ft. single-deck unit with 3-in. wire cloth. The material retained on this screen (3-in. to 6-in.) is discharged on a stock-pile and that passing the screen (3-in. minus) falls on a 24-in. inclined belt-conveyor (No. 3). This feeds a Stephens-Adamson 4-ft. by 8-ft. single-deck vibrating screen fitted with 1½-in. cloth. The oversize (1½-in. to 3-in.) goes to a stock-pile as needed, any of this size in excess of the requirements is diverted to an 18-in. horizontal belt-con-

into a surge-bin. A Jeffrey-Traylor 36-in. by 5½-ft. heavy-duty vibrating feeder discharges an even flow of stone from the bin to the 36-in. inclined conveyor (No. 1) which spans the valley to the main plant. This conveyor is equipped with a Dings 40-in. magnetic head-pulley which removes all tramp iron.

The stone is discharged on a Robins Gyrex 4-ft.



The three 86-S concrete mixers which discharge through central spout into skip cars.

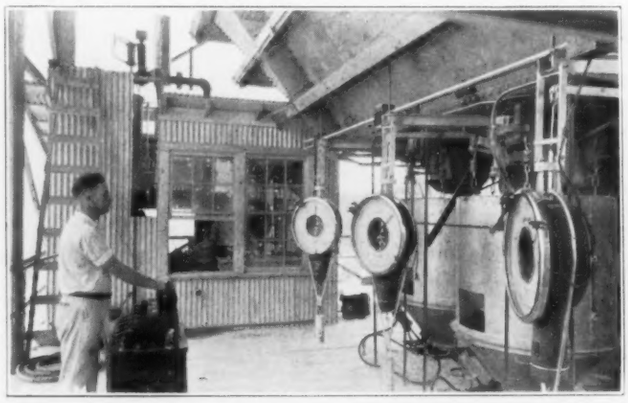
The 15-ft. wet classifier producing fine sand.

View of sand-classifying and screening plant.

The 12-ft. sand classifier which has just been installed.

veyor (No. 6), which serves as a collecting conveyor for the sand plant. This conveyor runs parallel to the screening-plant bridge.

The material passing this last screen (minus 1½-in.) is taken by a 20-in. inclined belt-conveyor (No. 4) to a Stephens-Adamson 5-ft. by 8-ft. single-deck vibrating screen having ¾-in. wire cloth. The oversize (¾-in. to 1½-in.) is chuted to storage as required and any excess is diverted to the conveyor running to the sand plant. The material passing this screen (¾-in. minus) is discharged on an 18-in. inclined belt-conveyor (No. 5), which discharges through a split chute on two Stephens-Adamson 5-ft. by 8-ft. single-deck vibrating screens equipped with No. 4 wire cloth. The oversize (No. 4 to ¾-in.) goes to storage. Any excess oversize and the minus No. 4 material passing this screen are discharged on the belt-conveyor (No. 6) running to the sand plant.



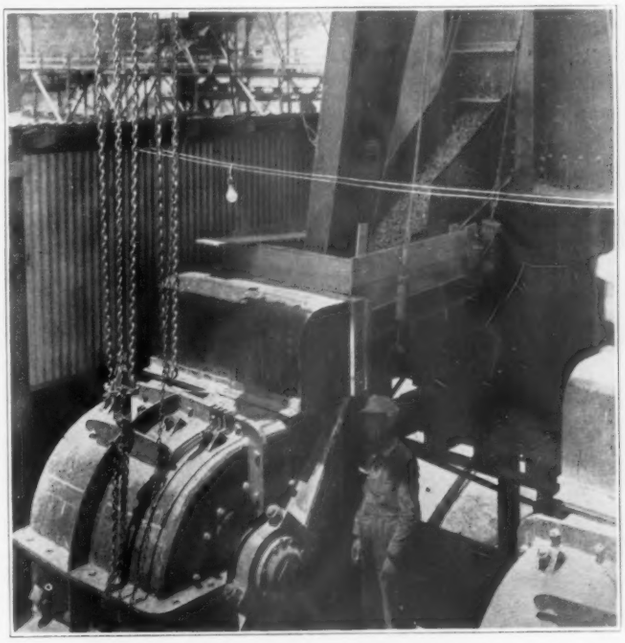
View on batching floor showing one of control stations and some of batchers and scales.

Conveyor (No. 6) discharges on an 18-in. inclined belt-conveyor (No. 7), which extends at right angles from the end of the bridge to the sand plant. This is located on the hillside above the bridge. The material is discharged from this conveyor into a 100-ton steel surge-bin. Two Jeffrey-Traylor 48-in. by 60-in. heavy-duty vibrating feeders provide a steady flow of material from this bin to the two Allis-Chalmers 42-in. by 48-in. Pulverator hammer-mills which produce the stone sand. Both mills discharge on a 20-in. inclined belt-conveyor (No. 13), which feeds by means of split chutes to four Allis-Chalmers Aero-Vibe 4-ft. by 10-ft. double-deck vibrating screens. These have 4-mesh and 8-mesh openings on their top and bottom decks, respectively.

The oversize (plus 4-mesh) material from these screens is discharged to a 16-in. inclined belt-conveyor (No. 8), which returns this material to the hammer-mill feeders. In order to correct the gradation of the sand a portion of the intermediate-sized material (8- to 4-mesh) is also returned in this manner to the hammer-mills. The remainder of this size is fed to a 16-in. belt-conveyor (No. 10), which carries it to a Barber-Greene 16-in. fixed inclined stacking conveyor. This discharges the sand to a stock-pile.

The minus 8-mesh material passing the sand screens is sluiced and split to a Link-Belt 15-ft. Rotoscoop sand-washer and a 12-ft. Dorr washer. Here the minus 100-mesh content is controlled to the desired percentage. Both classifiers discharge their product (minus 8-mesh) to a Barber-Greene 16-in. radial boom stacker which discharges it on a stock-pile that is of sufficient capacity to allow adequate drainage of this fine material before it is used.

All the six sizes of material produced (4 stone and 2 sand) are stored in stock-piles over a con-

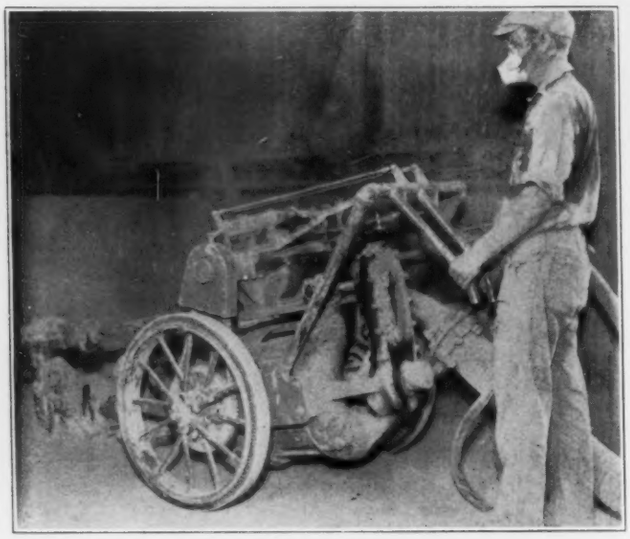


One of the two hammer-mills producing sand with vibrating feeder above.

The primary gyratory crusher at edge of quarry with vibrating feeder below.

crete reclaiming tunnel. The material is reclaimed through gates in the top of the tunnel by a 30-in. horizontal tunnel belt-conveyor (No. 16). This is inclined for a short distance at its discharge end where it emerges from the tunnel to allow unloading on the 30-in. inclined belt-conveyor (No. 19) supplying the concrete-mixing plant. Only one size of material is reclaimed at a time and delivered to the proper bin on the top of the concrete-mixing plant. A transfer station at the discharge end of the tunnel conveyor allows truck-loads of stone or sand to be withdrawn at this point for various miscellaneous purposes.

The special low-heat cement being used in the construction of Norris Dam is shipped by the various companies under contract to a railroad siding at Coal Creek, Tenn. It is shipped in bulk in ordinary box-cars which are lined with special tough, moisture-proof paper. At the siding the cars are unloaded by two 6-in. Fuller-Kinyon portable cement pumps which supply a 6,000-bbl. elevated steel silo. The cement is discharged from this silo by gravity through a Fuller rotary gate into special 65-bbl. aluminum tanks mounted on semi-trailers drawn by International motor trucks. These tractor-trailer units haul the cement a distance of 4.8 mi. to a point near the dam site over a concrete roadway constructed for this purpose and forming the northwestern end of the "Freeway."



One of the portable cement pumps which unload from cars into storage silo.

The contents of the trailer tanks are dumped by gravity by means of an overhead electric hoist which raises the front ends of the bodies and allows the cement to run out through the tail-gates. The cement in the receiving hopper is fed to either of two Fuller-Kinyon Type H 6-in. cement pumps, one of which is always kept in reserve. The cement can be pumped as desired either direct to the concrete-mixing-plant bins or to a 6,000-bbl. elevated steel silo, from which it can be discharged through a Fuller-Kinyon rotary valve and rehandled to the mixing plant by the same pumps. Each of the pumps is driven by a direct-connected 40-hp. electric motor.

The central-mixing concrete plant which will mix all the concrete used in the dam construction is a compact and efficient unit built entirely of steel on concrete foundations. While this plant has not yet been operated at capacity, it has shown that it can easily mix the 3,000 cu.yd. of concrete which will be required daily when construction activity is at its peak.

The sand-screening and classifying plant with stock-piling conveyors at right and sand-crushing plant at left.

The belt-conveyor which brings the aggregates from the tunnel-reclaiming conveyor to the mixing plant is 30 in. wide and operates on 228-ft. centers. It discharges the aggregate into a rotating spout which can discharge into any desired compartment of the overhead aggregate bin. There are six of these compartments with a total capacity of about 1,100 cu.yd. The two sand compartments have a capacity of 208 cu.yd. each. The stone-compartment capacities, beginning with the smallest size of stone, are 124, 128, 175 and 250 cu.yd., respectively.

The two cement compartments have a combined capacity of 166 cu.yd.

The cement and aggregates are fed through air-operated gates to the eight C. S. Johnson weigh-batchers on the batching floor. These are equipped with Kron dial scales and have air-controlled discharge valves. All the batching operations are controlled from two stations, one on each side of the batchers. One operator batches fine sand, coarse sand, fine gravel and medium gravel. The other operator batches coarse gravel, cobbles and cement. The batchers discharge to a central common hopper from which the material is discharged through a chute on a rotating turnhead to any one of the three concrete mixers on the floor below. In this

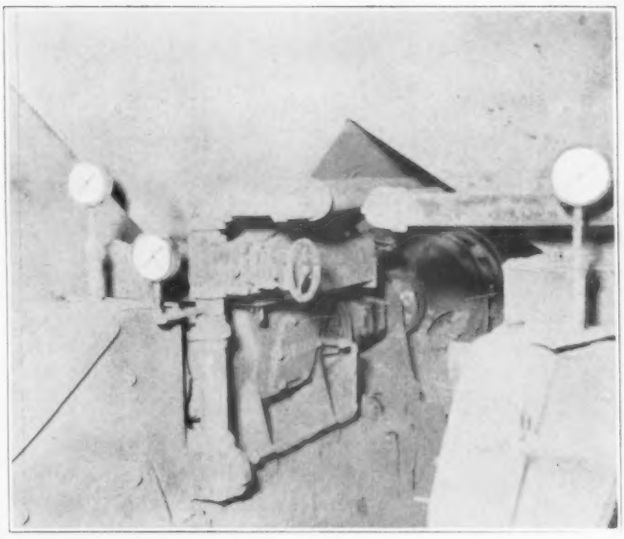
Crawler tractor assisting in the assembling of one of the electric shovels used in the quarry.

manner mixes are ready at regular intervals and an almost steady flow of concrete through the plant is provided.

The three T. L. Smith 86-S tilting mixers are arranged about a central opening and spout, through which they discharge to the concrete cars on tracks beneath. Each is equipped with the latest types of pneumatic dumping and time-control devices and is driven by a 40-hp. Louis Allis gear-motor with V-belt drive.

The Insley concrete cars are of special design and consist of two 4-cu. yd. skips mounted to discharge through a common side spout. The skips are tipped by electric motors which take their power from the generators of the locomotives hauling them. Each of the three cars is hauled by a 9-ton Plymouth gasoline-electric locomotive having a Westinghouse electric drive. At present only two units are in use, one locomotive and car being kept in reserve. The cars discharge into Insley hand-dump concrete buckets of 6-cu. yd. capacity which are also of special design. These are handled by the two cableways which span the valley and cover the entire dam, spillway and power-house area.

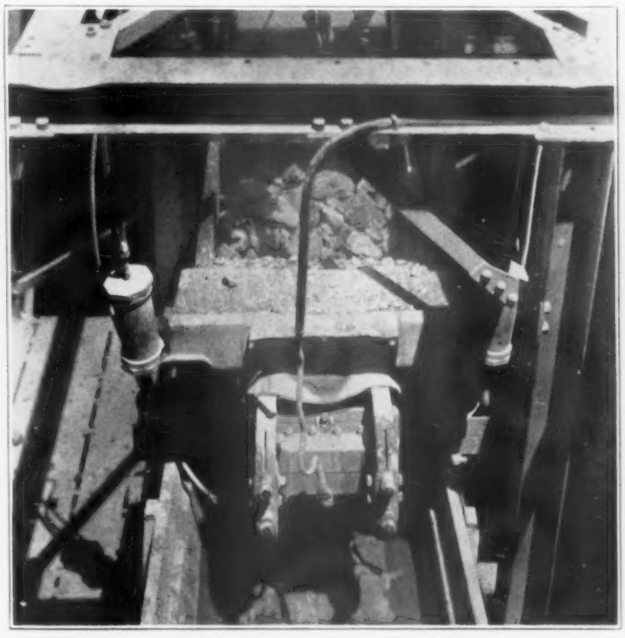
The cableways are similar to those being used at Boulder Dam. Their towers were built by the Virginia Bridge & Iron Co., their hoisting and traveling equipment by the Lidgerwood Mfg. Co., and the cable was furnished by the American Steel & Wire Co. The cableways have a clear span of 1,926 ft. and run on two 2-rail tracks spaced on 36½-ft.



The two cement pumps under the storage-silo which feed the concrete-mixing plant.

centers for the head towers and on 55-ft. centers for the tail towers. They can be moved a total distance of about 500 ft. to allow the placing of concrete at any point in the pouring area. The head towers are 75 ft. high and the tail towers 110 ft. high. Each cableway has a 3 in. track cable with a rated load-carrying capacity of 18 tons. The traveling speed of the concrete bucket is 1,200 ft. per min., the lowering speed 400 ft. per min., and the hoisting speed 300 ft. per min.

In the plants at Norris Dam the government spread its orders over a large number of manufacturers. The Allis-Chalmers Mfg. Co. supplied the primary crusher, the four vibrating sand screens, the two sand hammer-mills and two crawler tractors. The Robins Conveying Belt Co. furnished 12 belt-conveyors and the vibrating scalping screen. The Jeffrey Mfg. Co. made the Jeffrey-Traylor vi-



The 36-in. by 5½-ft. vibrating feeder discharging stone from primary crusher to belt-conveyor.

View taken July 13 showing cableway lowering bucket of concrete into cofferdam. Cement silo and concrete plant in background.

brating feeder under the primary crusher and the two feeders for the sand hammer-mills. One of the four vibrating stone-sizing screens is a Niagara and the other three were supplied by the Stephens-Adamson Mfg. Co. The two sand stock-piling belt-conveyors were furnished by the Barber-Greene Co. and the conveyor running to the concrete-mixing plant by the Link-Belt Co. which also supplied one of the two wet sand-classifiers. The second classifier was made by the Dorr Co. Conveyor belting is of a number of makes, including Manhattan, Hewitt, Acme, Thermoid and Diamond. General Electric, Westinghouse, Louis Allis and Century electric motors and gearmotors are used.

In the cement-handling and concrete-mixing plants all the cement pumps, piping and valves were supplied by the Fuller Co. T. L. Smith concrete mixers and C. S. Johnson weigh-batchers with Kron scales are used. Insley concrete cars and buckets handle the mixed concrete.

It is a tribute to the operating experience and engineering skill of the designers of this plant that it has worked smoothly without delaying construction of the dam. One minor condition, which is to be corrected in the near future, is the difficulty of screening the ¼- to ¾-in. stone in wet weather. A small amount of clay in the stone is screened easily enough when dry and is removed by the classifier, but when wet, it becomes sticky. A second deck with No. 8 wire cloth and sprays will be added to this screen to overcome this difficulty. It is also planned to install duplicates of the two screens producing the two intermediate sizes of stone to allow ample time for changing screen cloth and to give added capacity.

The original plans called for the building of a transmission line from Wilson Dam at Muscle Shoals, Ala., to supply power for these operations. Pending the completion of this line power is being obtained from the Tennessee Electric Power Co. under an interchange agreement. Power is obtained at 66,000 v. and is stepped down to 2,300 v. at a substation for motors of over 50 hp. Smaller motors use 440-v. current.

It is estimated that about 2,000 men are employed in the construction of this dam. Most of them are natives of the Tennessee Valley, many living within walking distance. For those not within commuting distance the model town of Norris has been built about 3 mi. from the dam site. The first buildings erected in Norris were dormitories for the single employees, a cafeteria, gymnasium and assembly hall, etc. With this as a nucleus the individual homes for married employees were erected. Although built at a moderate cost these homes are models of convenience and comfort. Unlike most communities of this kind the houses are individual in appearance and each one has an ample plot of ground. Electricity is used in these homes for lighting, cooking, providing hot water and heating.

Buses carry the men back and forth from Norris to the dam site. Work is being carried on in four 5½-hr. shifts, 6 days a week, allowing 2 hr. daily for the maintenance of the equipment. A vocational school, where employees have the opportunity to learn trades to be followed after the dam is completed, has been established. Many of the major repairs to the plant and dam equipment are made here.

Norris Dam is being built under the direction of Barton M. Jones, chief engineer, and Charles H. Locher, construction consultant for both this and the Wheeler Dam. Ross White is construction superintendent and C. D. Riddle is construction engineer.

Phosphate Rock in 1933

A sharp expansion of activity in the superphosphate industry was largely responsible for a relatively marked increase in domestic shipments of phosphate rock in 1933. The year showed advances over 1932 of 33 per cent. in total mine production (2,309,269 long tons) ; 46 per cent. in total tonnage shipped (2,490,312 long tons) ; and 37 per cent. in total value of shipments ($7,872,362). In 1933 phosphate rock was produced and shipped in Florida, Idaho, Montana, Tennessee, and Virginia.

Florida led all other States, as usual, in total shipments. Compared with 1932 marketed production in the State increased 45.3 per cent. in quantity and 34.3 per cent. in value, and the tonnage constituted 85.8 per cent. of the total domestic shipments. In 1932 Florida shipped 86.1 per cent. of the total. Tennessee ranked second in total output in 1933 and shipments increased more than 70 per cent. over 1932. Tennessee and Virginia shipped 34.1 per cent. of the total domestic shipments in 1933, compared with 11.3 per cent. in 1932.

Although total sales realizations of the producers were higher in 1933 the apparent increase in demand was not followed by a rise in prices. Total average prices, as reported by producers, for the different grades of rock sold were consistently lower.

Newest Self-Unloading Boat Designed to Handle Either Liquids or Solids

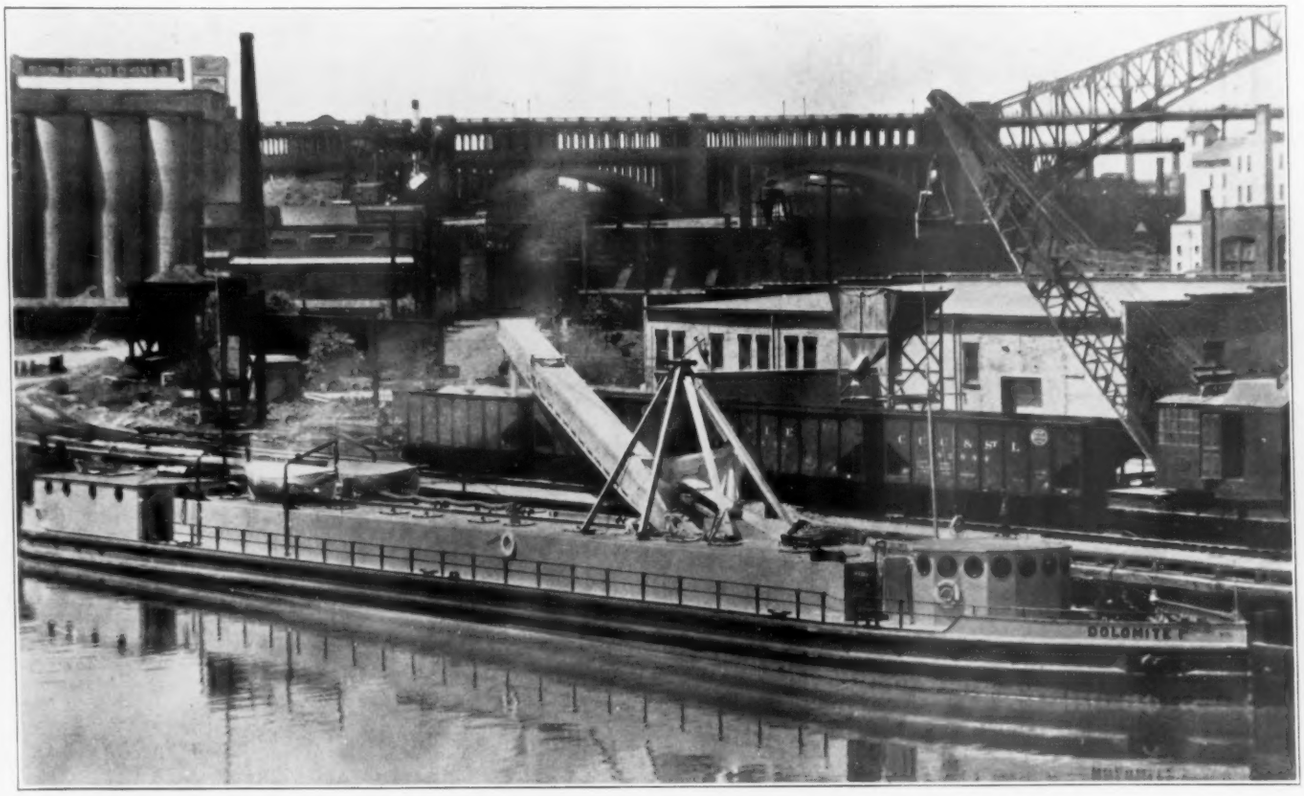
Has All-Welded Steel Hull and Can Operate on Oceans or Lakes

By W. E. TRAUFFER

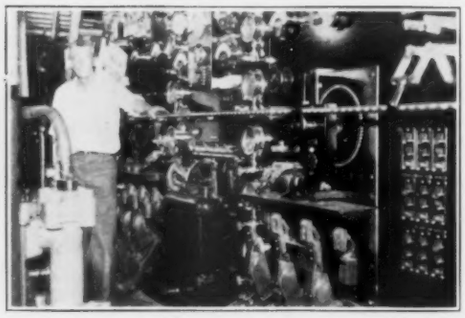
THE use of self-unloading boats for the transportation of cement, crushed stone, sand and gravel and other nonmetallic minerals and products, which was increasing at a rapid rate before the depression, now again seems to be gaining in popularity. Perhaps the most interesting development in this field in recent years was the construction of the ship Dolomite No. 1 for the Dolomite Products Co., Inc., Rochester, N. Y. The chief feature of this boat is its ability to handle both liquid and solid materials, at the same time if desired. It is said to be the largest all-welded steel freighter ever built in this country and is able to navigate in lakes, rivers and canals and in limited coastwise service. It is of the partly-submersible type to facilitate passage under low bridges in canals and has a displacement when loaded of 1,800 tons. Its speed when loaded is 12 knots.

The Dolomite No. 1 was designed by John H. Odenbach, president of the Dolomite Products Co., and John Cattanach, chief engineer of the Dolomite Marine Corp., a subsidiary, of which Mr. Odenbach is general manager. The boat was built in the yards of the latter company near Rochester, N. Y., where it was launched Oct. 20, 1933. It was then moved through the Oswego and Erie Canals to Albany, where installation of the handling equipment was completed. This work was finished in February, 1934, and the boat was almost immediately put into service.

The first cargo was fuel oil which was hauled coastwise from a Southern port to New York and the second was grain carried between Albany and Baltimore. Phosphate was also hauled from Carteret, N. J., to Port Hope, Canada, and sulphur and salt are now being hauled between Philadelphia, Cleveland and Detroit. The first trip between Philadelphia and Cleveland with a load of sulphur was completed early in June. The route was up Hudson River to Albany, then via the Erie and Oswego Canal to Lake Ontario at Rochester and through the Welland Canal and across Lake Erie to Cleveland. On this trip the Dolomite No. 1 arrived at Rochester

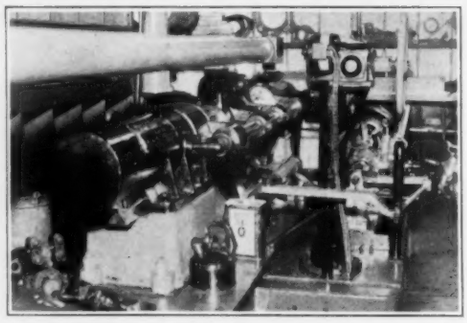


The Dolomite No. 1 unloading a cargo of sulphur direct into railroad cars at Cleveland, O. Note inclosed boom conveyor and small amount of dust.



The main switchboard in the engine-room which controls all operations.

Part of the control equipment in the pilot-house.



The hydroëlectric steering mechanism at the stern of the boat.

on a Sunday and open house was declared for visitors, thousands of whom took advantage of the opportunity to inspect the boat which had received wide publicity from the local press.

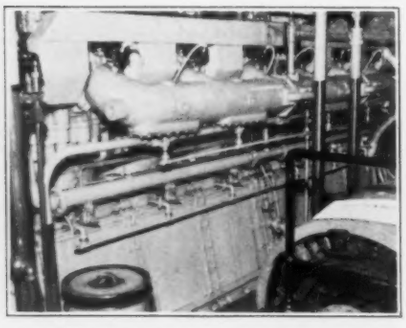
The boat has a cargo capacity of 1,100 tons of either solids or liquids. In volume it has a capacity of 48,730 cu.ft. for liquids or 37,200 cu.ft. for bulk material. The hold is divided into 7-bin compartments of 100-ton capacity each on each side of the center line of the boat, while additional tanks in the center, sides and bottom of the boat can be used when hauling liquids. Each compartment has three individual lever-operated sliding gates which are sealed with rubber gaskets when liquids are to be carried. A centrifugal pump having a capacity of 1,500 gal. per min. is used for unloading liquid cargo and can also be used for handling liquid ballast. Depending on the cargo, the boat may be loaded in from 1 to 6 hr. and unloaded in from 3 to 6 hr.

When solids are being handled the 21 hopper gates on each side feed two 24-in. by 156-ft. centers belt-conveyors. These are inclined at their discharge ends to unload on two 24-in. by 10-ft. centers inclined cross conveyors near the bow of the boat. These discharge to a centrally-located inclined hold belt-conveyor running laterally which is 36 in. wide and operates on 65-ft. centers. This conveyor discharges through a hopper to the boom belt-conveyor which is 36 in. wide and operates on 85-ft. centers. The structural-steel boom is completely inclosed with sheet steel to allow unloading under any weather conditions. It is suspended by cable from a structural frame in such a manner that it can be swung in an arc of 100 deg. to each side of the center-line of the boat.

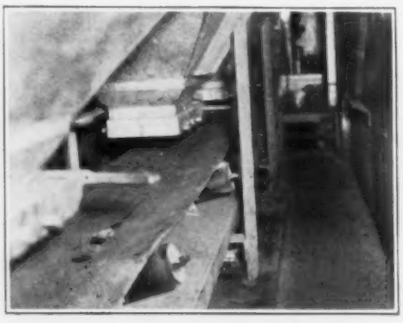
The hold belt-conveyor is driven at its tail pulley by a 10-hp. motor through a gear reducer. The discharge end of this conveyor is designed so that it can be telescoped to the deck level when not in use. The section of the conveyor frame holding the conveyor head-pulley slides back about 8 ft., the belt sliding down into the frame. The steel hopper has a telescoping discharge spout and when not in use drops out of the way into the deck. The boom also drops into a recess in the deck and when all these units are battened down the boat is seaworthy in the roughest weather.

The tunnel conveyors are driven at their head ends by 5-hp. Allis-Chalmers d.-c. motors through Falk reducers and the cross conveyors have similar drives with 1½-hp. motors. The boom conveyor is driven at its tail pulley through a Falk reducer by a 10-hp. motor. The belt-conveyor idlers and pulleys were furnished by the Robins Conveying Belt Co., and Republic Rubber Co. "Super-Excelo" conveyor belting is used throughout. This unloading system has a capacity of 400 tons per hr. of dry solid materials.

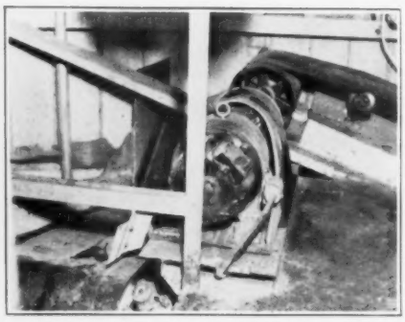
The hull of the boat is 214 ft. long with a beam of 32 ft. and a moulded depth of 12 ft. 4 in. The hull is built of 12-in., 20.7-lb. steel channels running transversely up and down the sides of the hull and across the bottom. The channels were delivered to the shipyard in 60-ft. lengths and were then bent and shaped cold by a patented process. When placed in position they were welded continuously, heel and toe, to the adjoining channels. The bow and deck are also constructed of 12-in. channels but the stern is plated. Bulkheads are located every 18 ft. amidship with two additional bulkheads aft and two for-



The starboard 440-hp. Diesel engine with propulsion motor at right.



Hoppers and sliding gates over belt-conveyor in one of unloading tunnels.



Tunnel conveyor at right discharges to cross conveyor at left.

ward. It is estimated by the designers that a saving of about 30 per cent. in the total dead weight of the ship was made by this type of construction below the cost of a comparable riveted design. The draft when the boat is loaded to capacity is 10 ft. 6 in.

The main power-plant consists of two 6-cyl. Busch-Sulzer 4-cycle, air-injection Diesel engines having 14¼-in. bore and 14½-in. stroke, each developing 440 b. hp. at 360 r.p.m. Each engine drives a direct-connected Diehl Mfg. Co. 316-kw., 300-v., d.-c. generator and a 25-kw., 125-v. auxiliary generator driven through chain. Excitation is supplied by a 1,900-amp.-hr. storage-battery which is also used to start the engines. The main propulsion motors are two Diehl Mfg. Co. d.-c. electric motors each developing 350 b. hp. at 350 r.p.m. Each motor is direct-connected to a 4-bladed cast-steel propeller 5 ft. 6 in. in diameter and having a 38-in. pitch. A third 25-kw., 125-v. auxiliary generator of Westinghouse manufacture is direct-driven by a 4-cyl., 50-hp. Winton Diesel engine. Other equipment includes a Sharpless Super-Centrifuge for oil, a small 2-cyl. Ingersoll-Rand air-compressor and a Worthington circulating water and oil pump.

The General Electric main switchboard in the engine room controls all the operations except steering and has start and stop pushbuttons for all the motors, switches, relays, ammeters, etc. A Tycos pyrometer with a Bristol 14-point control allows selective reading of the exhaust temperature of any cylinder of the three Diesel engines. A microphone is connected to ten different points on the boat, including the pilot house.

The Dolomite No. 1 docked at Rochester, N. Y. A few of the many people who took advantage of "open house" are shown.

The pilot-house is located so that the pilot has an unobstructed view in all directions at all times. In it are installed the latest types of equipment, including compass, clock, barometer, searchlight, foghorn, etc. There is also a Cutler-Hammer ship-propulsion-motor control which gives the pilot direct control over the motors. There is also a direct control of the steering mechanism, which is located in the stern of the boat, back of the engine room, and is of the hydroelectric type furnished by the Hyde Windlass Co. The electric windlass at the bow of the boat was furnished by the American Hoist & Derrick Co.

This boat could also serve as a model in the measures taken for the comfort of the crew. These rival those of a first-class hotel, the facilities including an all-electric kitchen, tiled shower- and wash-rooms, bunk-rooms which are the last word in comfort, radios, etc.

Safety measures have not been neglected in the design of this boat. In addition to a water fire system there is a valve-controlled CO^2 gas system which is piped to all sections of the boat. All openings in the hull or superstructures can be sealed tightly and in rough weather the crew can move from the pilot-house, bunk-rooms, engine-room, etc., to any other part of the boat through inside passages.

The Dolomite Marine Corp. is now laying plans for the construction of the Dolomite No. 2, a larger ship designed along similar lines for lake and ocean service. Later additional ships of the same general design are to be built.

Silicosis Insurance (from page 32)

where the courts have held time and again that the failure of an insurance carrier to deny liability promptly is an admission of liability. Not only could the carrier have been held liable under the policy itself, but its failure to deny liability promptly strengthened the employer's case.

If the diseases common to your business are covered by the compensation act of the state in which you operate, your insurance policy, if in the regulation form, undoubtedly covers. This, however, applies to a very limited number of states. Most states having workmen's compensation laws do not include diseases which may occur in quarrying, cement manufacturing and similar operations, so the rights of the employee are under the old common-law system, and under the endorsement used at present the employer is left without protection, although he pays a substantial charge for supposed protection.

Until employers throughout the country awaken to this situation and demand a change in the present endorsement, the carriers will of course insist upon its use. These claims are usually filed many years after the man leaves the employment in which the disease is alleged to have been contracted. Claims which may be filed years hence, alleging disability resulting from employment during the period in which the present so-called "inclusion" endorsement was in use, will be clearly and legally thrown back upon the employer.

Claims filed in the last few years, those now being filed and those to be filed within the next few years alleging disability resulting from periods of employment covered by the standard policy *without* either the "exclusion" or "inclusion" endorsement *are covered, regardless of contrary statements by the insurance carriers.*

Batching Plant for Truck-Mixed Concrete Handles Aggregates by Gravity

Trucks Discharge Aggregates From Quarry Level Directly Into Bins

THE Colonial Concrete Co., Inc., a new corporation, early in 1934 put in operation a new batching plant for the production of truck-mixed concrete. The plant is located on the property of the Orange Quarry Co., West Orange, N. J., from whose plant all the crushed stone required is obtained. A feature of this plant is the handling of all materials by gravity.

Aggregates, including crushed stone, cinders, and sand and gravel from a local pit, are hauled by truck to the quarry floor-level and discharged directly into two Blaw-Knox 3-compartment steel bins, each having a total capacity of 250 cu.yd. One compartment of each bin is used for sand and the others for gravel, stone and cinders. Three clam-shell gates under each bin feed the desired materials from these compartments to 7,500-lb. capacity Blaw-Knox weighing batchers under each bin. These are equipped with Howe beam scales.

Cement is stored in a warehouse slightly above the batcher floor-level. All brands of cement popular locally are carried. Sacked cement is wheeled from this warehouse to a point near the bins where it is dumped from the sacks into a hopper in the quantity required for each batch. A screw-conveyor, inclined slightly upward, carries the cement to a Blaw-Knox cement weigh-batcher under the bin nearest the warehouse. The scale on this batcher is not being used for weighing the cement but is kept balanced to indicate when it is completely discharged.

Mixer trucks are loaded with sand and the desired coarse aggregate under either bin and with cement under the bin nearest the warehouse. As crushed stone, for which the demand is greatest, is stored in this bin, loading can usually be done without moving the truck. Water is obtained from a drilled well in the quarry.

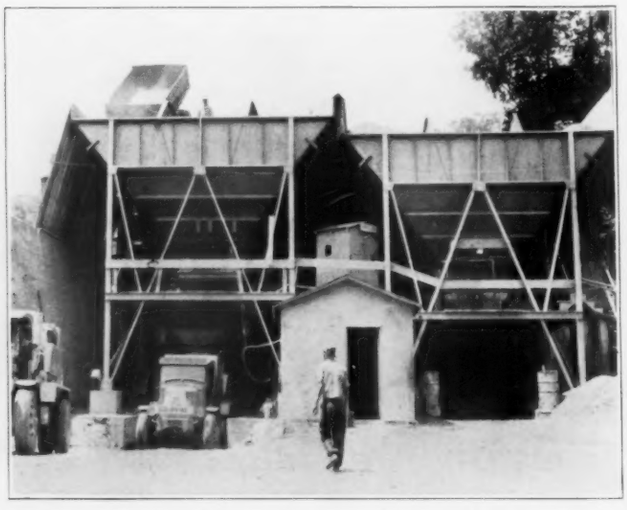
Mixing and delivering of the concrete is done with seven Mack 7½-ton trucks on which are mounted 3½-cu.yd. Jaeger Transit Mixer bodies. The bodies are rotated through take-offs from the truck's power-plant. All the trucks are equipped with Kelly-Springfield tires. Most of the concrete produced is sold for private and public-utility construction work.

Talc and Soapstone in 1933

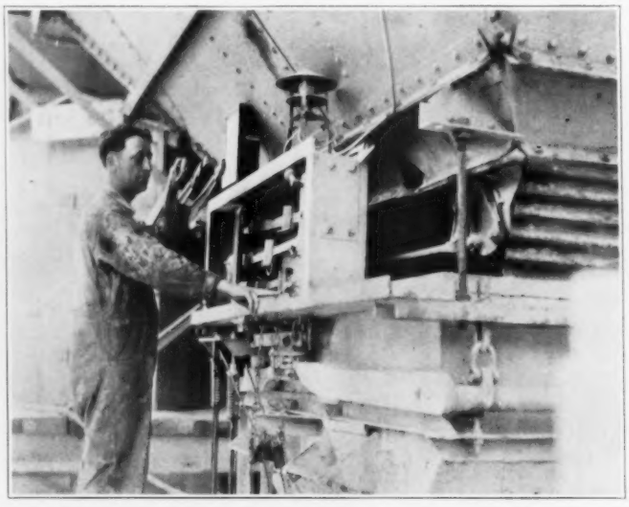
In 1933 the talc and ground soapstone industry made substantial gains in commercial output. Compared with 1932, total shipments by 29 producers registered increases of 30.3 per cent. in quantity and 23.5 per cent. in value. The 1933 figures reveal decreases of about 30 per cent. in quantity and 36 per cent. in value from the high output of 1929. All major operations in 1933 were conducted by practically the same personnel as in 1932, although four additional producers—three of whom were new—reported small shipments during the year.

Compared with 1932, average prices as reported by producers showed little change. Ground talc and soapstone, which comprise more than 95 per cent. of the total shipments, ranged from $2.50 a short ton for low-grade material to $30.00 a ton for the highest grade of ground talc.

The principal producing states in 1933 were California, Georgia, Maryland, Michigan, New Jersey, New York, North Carolina and Pennsylvania.



Aggregate truck discharging into one of bins with mixer truck in position for loading below.



One of the 7,500-lb. capacity aggregate-weghing batchers with beam scales and tell-tale dial.

MEN OF THE INDUSTRY

JOHN H. ODENBACH

JOHN H. ODENBACH, president and general manager of the Dolomite Products Co., Rochester, N. Y., left the restaurant business in 1920 and incorporated the above company at that time. Several large crushed-stone and sand-and-gravel plants involving many original features were designed, built and operated by him. In 1932 he formed the Manitou Construction Co. and added general highway contracting to his list of activities. In 1933 he formed the Dolomite Marine Corp. for the building of self-unloading electric-welded steel motorships. The first of these, the Dolomite No. 1, has been in active service since the first of the year transporting both liquid and solid cargoes.

Personal Mention

Ben F. Dickinson, vice president of the Big Rock Stone & Material Co., Little Rock, Ark., has been elected a director of the W. B. Worthen Co., Bankers, of that city.

L. S. Stephens has been elected to succeed **D. B. Piersen** as president of the Stephens-Adamson Mfg. Co., Aurora, Ill. Mr. Piersen, one of the founders of the firm, was made chairman of the board upon the resignation of W. W. Stephens. No other changes have been made; **R. C. Pierce** is vice president and western manager, **F. G. Adamson** is treasurer, **C. H. Adamson** is secretary, **M. A. Kendall** is chief engineer and **C. A. Krause,** is assistant treasurer.

N. D. Veth

N. D. Veth has been appointed by the Chase Foundry & Mfg. Co., Columbus, O., as chief engineer. He was formerly associated with the Watt Car & Wheel Co. in the capacity of car designer.

Henry M. Chase, for many years chief engineer of the Holyoke, Mass., works of the Worthington Pump & Machinery Corp., has retired. He had been connected with the engineering department of this company since 1891.

J. E. Donelson, superintendent of the slag and concrete operations of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has been named a member of the code authority for the ready-mixed concrete industry.

Ralph C. Harden has been appointed by the U. S. Rubber Co. as manager of packing sales in the Mechanical Goods Division. He will be located at the company's main offices at 1790 Broadway, New York City.

J. J. Richards has been appointed manager of the Vibrating Screen Department of the Link-Belt Co., Philadelphia, Pa., succeeding **Harry L. Strube** who has been promoted to the position of assistant chief engineer of the company's Philadelphia plants.

Lon R. Smith has rejoined the sales force of the Hercules Motors Corp., Canton, O., as assistant sales manager and will also assist in the Diesel engine sales program. Charles Dahlquist and G. C. Rasey will represent the Hercules Diesel engine line in the automotive and industrial fields.

George Phillip, chairman of the South Dakota State Cement Plant Commission, has resigned his position to become U. S. District Attorney for that state.

Sewell W. Avery, president of the U. S. Gypsum Co., was recently appointed one of the nine members of the advisory committee of the American Standards Assn.

John W. Finch, former dean of the University of Idaho School of Mining, has been appointed director of the U. S. Bureau of Mines, succeeding Scott Turner who has opened an office in Washington, D. C., as a consulting mining engineer.

Michael J. Degnan, former Mayor of Hudson, N. Y., and a member of the organization of the Universal Atlas Cement Co. at Greenport, N. Y., for over 25 years, has been promoted to the position of Safety Supervisor for the plant.

Charles L. Hogan, president of the International Cement Corp., New York City, was recently elected a director of the Equitable Trust Co. of that city. Other new directors include **Edward M. Allen,** president of the Mathieson Alkali Works, Inc.; **Harry W. Croft,** chairman of the Harbison-Walker Refractories Co.; and **A. F. Stock,** treasurer of the American Agricultural Chemical Co.

Obituary

Nathan L. Bell, a veteran of the cement industry, died Aug. 24 at his home in San Francisco, Cal., after a brief illness. He organized the Pacific Portland Cement Co. in 1901 and served as vice president and manager for several years. Later he organized the Nevada Gypsum Co. and participated in other mining projects.

James A. Wheeler, 70, a former vice president of the Lone Star Cement Co., Texas, died August 12 at his home in Dallas, Tex.

James W. Jameson, 72, an organizer of the Blue Diamond Corp. Ltd., and a director of the Monolith Portland Cement Co., died Aug. 6.

W. M. Williamson, 59, general manager of the Memphis Stone & Gravel Co., Memphis, Tenn., died suddenly August 14 of a heart attack.

Frank Schlosser, 73, widely known quarry operator of Covington, Ky., died Aug. 10 at his home in that city following an illness of two weeks.

Jay E. LaBarre, 51, sales manager for the American Lime & Stone Co. for the Pittsburgh, Pa. district died August 8 in a hospital in that city.

▼ *Coming Events* ▲

September 3-8, 1934, Munich, Germany. Seventh International Road Congress and International Road Exhibition, American National Committee, 1723 N Street N.W., Washington, D. C.

October 1-5, 1934, Cleveland, O.—Twenty-third Annual Safety Congress and Exposition, National Safety Council, Carter, Statler and Cleveland Hotels, Cleveland, O.

December 3-8, 1934, New York, N. Y. Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City.

Lime Assn. Publishes Masonry Mortar Bulletin

The National Lime Assn., 927 15th St. N. W., Washington, D. C., announces the publication of Bulletin 321 entitled "Masonry Mortar." This 36-page bulletin is designed to promote better masonry construction and is based upon the results of careful research analyses. The masonry mortar problems are discussed and a series of recommendations are made for martar mixes for various types of masonry. Copies will be furnished upon request to the National Lime Assn.

Chicago Pneumatic Buys Diamond Drill Company

The Chicago Pneumatic Tool Co., New York City, has purchased the assets of the Mitchell Diamond Drill Co., Ltd., San Francisco, Cal., including patents and good will.

New Corporations

TROY TRAP ROCK CORP., Cropseyville, N. Y. Capital $10,000. Incorparators, George M. and Frances R. McKinney of Ellenburg Depot, and Henry Loveridge. Organized to deal in building materials.

J. & F. Co., Milwaukee, Wis. Capital

DAYTON SAND & GRAVEL CO., Oklahoma City, Okla. Capital $7,500. Organizers, Tom C. Dayton, Leona Dayton of Dougherty, Okla., and Carol Porter, Oklahoma City, and Paul Brown.

SOUTHERN CONCRETE CO., Louisville, Ky. Capital $5,000. Incorporators, C. W. Stooke, M. G. Stooke and C. C. Collier.

SHARPE SAND & GRAVEL CO., Wilmington, Dela. Capital $3,000. Incorporated by Martin Smith. To deal in sand, gravel and clays.

EDISON CONCRETE CORP., New York, N. Y. Capital $10,000. Filed by Maxwell Berman. To deal in concrete, stone and brick.

PALESTINE QUARRIES, LTD., Mt. Vernon, N. Y. Capital 198 shares n.p.v. Incorporators, Jehiel R. Elyachar, Sol Nitzberg and Louis L. Simberkoff.

VALLEY WASHED SAND & GRAVEL CORP., Muskego, Wis. Capital 200 shares, $100. Incorporators, Frank J. Mayworm and Kate and Tom Filich. To operate gravel pit.

BERLIN BRICK & SAND CO., Atlantic City, N. J. 1000 shares n.p.v. Incorporators, John Quigley, H. Walter Schmeck and Ralph Harcourt. To manufacture, buy

Labor Conditions

EMPLOYMENT, wage rates, hours worked per week, weekly earnings and pay-rolls continued to increase in the nonmetallic-mining and cement industries in May, the latest month for which complete figures are available. The improvement with respect to employment and pay-rolls continued in June, but July showed a slight recession for both industries. Complete figures for June and July on weekly and hourly earnings and hours worked per week are not yet ready.

Quarrying Industry.—Employment in May reached 36,111 in the 1,148 plants reporting (an index of 54.3, taking the 1923-1925, 3-yr., average as 100), and in June 38,250 in 1,149 plants (index 56.6), the latter figure being the highest in a year (Table I). The May index showed an increase of 11.4 per cent. above April and 25.1 per cent. above May, 1933. The June index was 4.4 per cent. above the May figure and 19.7 per cent. over that of the same month of last year. In July employment fell to 34,830 in 1,087 plants reporting, the index, 55.6, showing a 1.9-per cent. decrease from the June index but an increase of 12.3 per cent. above that of July, 1933.

One-week pay-rolls amounted to $615,248 in May (index 35.0), an increase of 17.3 per cent. above April and of 47.1 per cent. above the preceding May. In June they rose to $648,890 (index 37.0), an increase of 5.5 per cent. over May and 34.5 over the previous June. July pay-rolls fell to $568,501 which, except for May and June, was still the highest figure in a year.

Per-capita weekly earnings reached $17.04 in May—the highest figure in 12 months—showing increases of 5.3 per cent. for the month and 17.7 per cent. for the year. The average number of hours worked per week was 36.0, the highest since August, 1933, when code restrictions were not yet in effect. This represents an increase of 4.0 per cent. over April, but a decrease of 8.0 per cent. below the pre-code month of May a year ago. Average hourly earnings rose to 47.5c. in May, the highest figure in a year and an increase of .8 per cent. above April and of 30.1 per cent. over May, 1933.

Wage-rate adjustments upward continued in May (Table II). Increases became effective in 25 plants and affected 2,495 workers. This was the largest number of plants and workers showing increases since September, 1933. No decreases were reported in May.

Table III shows comparisons in employment and pay-rolls for April and May in 1,152 identical plants. These employed 36,879 workers in May, and paid wages in a single week amounting to $630,480.

Increases in employment, as compared with April, occurred in all states except 8 (Alabama, California, Colorado, Florida, Missouri, Montana, New Hampshire and North Carolina). In three states—Mississippi (51.3 per cent.), Utah (50.9 per cent.) and Wisconsin (60.7 per cent.)—the increases were greater than one-half, and in four other states—Massachusetts 25.5 per cent.), Michigan (26.2 per cent.), Nebraska (35.9 per cent.) and South Dakota (37.3 per cent.)—the increases exceeded one-fourth. In 11 other states gains of more than 15 per cent. were reported—Connecticut 15.5 per cent., Delaware 17.2, Indiana 19.7, Iowa 24.8, Maine 15.3, Minnesota 18.4, New York 15.3, Ohio 15.4, Oklahoma 20.3, Oregon 20.8 and Pennsylvania 15.8.

Table I.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
1933																		
July	1,134	33,044	49.5	**4.8**	[2]	$498,991	28.4	**3.6**	2.4	$15.10	1.2	2.4	41.4	**.4**	.....	37.2c.	1.0	.....
August	1,142	34,553	57.6	**4.2**	**1.0**	520,098	29.9	**5.1**	**.7**	15.05	**.9**	.3	38.7	7.0	.....	40.4c.	**8.8**	.....
September	1,152	35,442	52.6	**1.9**	**.4**	516,932	29.3	2.0	3.9	14.59	3.8	4.3	34.4	1.11	.....	42.8c.	7.1	.....
October	1,202	36,894	53.2	**1.1**	**1.5**	566,803	31.2	**6.4**	**3.7**	15.36	**5.2**	**2.1**	34.8	**1.4**	.....	44.7c.	**3.5**	.....
November	1,185	34,303	51.1	3.9	**3.4**	497,238	28.3	9.3	**4.4**	14.50	5.5	**.9**	32.5	6.6	.....	45.2c.	**1.1**	.....
December	1,162	30,658	45.3	11.3	**7.1**	434,751	24.4	13.7	**10.4**	14.18	2.7	**3.3**	31.3	3.7	.....	46.1c.	**.9**	.....
1934																		
January	1,144	26,217	39.7	12.5	**13.1**	368,224	21.3	12.6	**17.7**	14.05	.1	**4.1**	30.8	1.9	.....	45.6c.	**.2**	.....
February	1,192	26,561	38.8	2.2	**11.5**	374,577	21.0	1.5	**20.7**	14.10	**.7**	**8.2**	31.1	**1.3**	.....	45.4c.	[2]	.....
March	1,180	28,610	42.0	**8.3**	**19.7**	434,572	24.1	**14.8**	**35.4**	15.19	**5.9**	**13.2**	33.5	**6.3**	2.7	45.6c.	**.7**	**17.7**
April	1,186	32,629	48.7	**15.9**	**23.9**	522,154	29.9	**23.9**	**48.0**	16.00	**6.9**	**19.5**	34.2	**4.0**	4.3	46.9c.	**2.6**	**27.1**
May	1,148	36,111	54.3	**11.4**	**25.1**	615,248	35.0	**17.3**	**47.1**	17.04	**5.3**	**17.7**	36.0	**4.0**	8.0	47.5c.	**.8**	**30.1**
June	1,149	38,250	56.6	**4.4**	**19.7**	648,890	37.0	**5.5**	**34.5**	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	1,087	34,830	55.6	1.9	**12.3**	568,501	35.0	5.4	**23.2**	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers were based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.
[2] No change.

Table II.—CHANGES IN WAGE RATES IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
July 15	1,144	26,217	1,138	26,149	6	68	.....	.....
Aug. 15	1,142	34,553	1,033	29,638	109	4,915	.....	.....
Sep. 15	1,152	35,442	1,059	32,390	93	3,052	.....	.....
Oct. 15	1,202	36,894	1,179	35,305	21	1,516	2	73
Nov. 15	1,185	34,303	1,178	34,132	7	171	.....	.....
Dec. 15	1,162	30,658	1,149	30,431	12	214	1	13
Jan. 15	1,144	26,251	1,138	26,149	6	68	.....	.....
Feb. 15	1,192	26,561	1,189	26,536	3	25	.....	.....
Mar. 15	1,180	28,610	1,179	28,550	1	60	.....	.....
Apr. 15	1,186	32,629	1,166	31,007	20	1,622	.....	.....
May 15	1,148	36,111	1,123	33,616	25	2,495	.....	.....
June 15	.....	.....	.....	.....	.....	.....	.....	.....

Table V.—CHANGES IN WAGE RATES IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Number of Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
July 15	122	16,072	108	13,482	14	2,590	.....	.....
Aug. 15	111	15,787	60	5,081	51	10,706	.....	.....
Sep. 15	129	15,545	126	15,451	3	94	.....	.....
Oct. 15	131	13,199	128	12,609	3	510	.....	.....
Nov. 15	113	10,071	113	10,071	.....	.....	.....	.....
Dec. 15	129	10,851	129	10,851	.....	.....	.....	.....
Jan. 15	121	9,495	121	9,495	.....	.....	.....	.....
Feb. 15	125	12,745	125	12,745	.....	.....	.....	.....
Mar. 15	120	13,023	120	13,023	.....	.....	.....	.....
Apr. 15	119	12,414	96	7,694	23	4,720	.....	.....
May 15	122	17,593	115	16,372	7	1,221	.....	.....
June 15	.....	.....	.....	.....	.....	.....	.....	.....

In every state but 7 (California, Colorado, Florida, Missouri, New Hampshire, North Carolina and Tennessee) pay-roll increases were reported. Alabama, which showed a 2.5-per cent. decline in employment, reported a 15.1-per cent. increase in pay-rolls. Montana, with an employment decrease of 3.3 per cent., showed a pay-roll increase of 16.3 per cent. In both cases, obviously, either wage rates or working hours, or both, have been materially increased.

Similar increases occurred in other states in which pay-roll increases outran employment increases. Some prominent instances are Delaware (employment up 17.2 per cent., pay-rolls up 39.1 per cent.), Georgia (employment 8.5, pay-rolls 16.9), Illinois (9.7 and 12.1), Indiana (19.7 and 34.0), Iowa (24.8 and 35.3), Kansas (2.1 and 7.6), Maine (15.3 and 21.9), Maryland (7.9 and 18.5), Massachusetts (25.5 and 35.6), Michigan (26.2 and 35.4), Minnesota (18.4 and 24.4), New Jersey (11.4 and 18.7), New York (15.3 and 21.8), Ohio (15.4 and 24.1), Pennsylvania (15.8 and 23.6), South Carolina (.9 and 19.1), Vermont (7.3 and 17.9), Virginia (8.7 and 18.0), West Virginia (9.8 and 21.7), and Wisconsin (60.7 and 104.5). In only a few cases did pay-roll increases fail to keep pace with employment gains. Tennessee is the only state in which an increase in employment (4.6 per cent.) was accompanied by a decrease (4.9 per cent.) in pay-rolls.

Table III.—COMPARISON OF EMPLOYMENT AND PAY-ROLLS IN IDENTICAL QUARRY AND NONMETALLIC-MINING ESTABLISHMENTS, IN APRIL AND MAY, 1934, BY STATES

(Gains are shown in bold-faced type, losses in light-faced type)

State	Number of Establishments	Number on Pay-Roll, May, 1934	Percentage of Change from April, 1934	Amount of Pay-Roll (1 week) May, 1934	Percentage of Change from April, 1934
Alabama	16	596	2.5	$7,291	**15.1**
Arizona	3	46	**9.5**	651	**2.5**
Arkansas	8	211	**12.2**	3,009	**16.2**
California	41	1,117	2.4	22,527	1.6
Colorado	4	27	6.9	341	19.0
Connecticut	25	327	**15.5**	5,643	**14.8**
Delaware	3	68	**17.2**	1,409	**39.1**
District of Columbia					
Florida	17	853	4.3	10,529	3.2
Georgia	25	1,462	**8.5**	15,186	**16.9**
Idaho					
Illinois	18	631	**9.7**	11,884	**12.1**
Indiana	62	1,670	**19.7**	29,335	**34.0**
Iowa	29	619	**24.8**	9,980	**35.3**
Kansas	33	1,293	**2.1**	24,988	**7.6**
Kentucky	40	1,132	**12.2**	13,927	**12.7**
Louisiana	12	474	**6.3**	6,259	**3.0**
Maine	9	536	**15.3**	12,775	**21.9**
Maryland	10	410	**7.9**	10,028	**18.5**
Massachusetts	20	482	**25.5**	10,954	**35.6**
Michigan	47	1,843	**26.2**	34,627	**35.4**
Minnesota	26	360	**18.4**	5,905	**24.4**
Mississippi	9	230	**51.3**	3,645	**43.4**
Missouri	50	1,255	5.1	17,424	7.2
Montana	5	58	3.3	1,034	**16.3**
Nebraska	11	178	**35.9**	2,560	**22.0**
Nevada					
New Hampshire	11	230	7.3	5,610	16.1
New Jersey	37	682	**11.4**	12,226	**18.7**
New Mexico					
New York	78	2,694	**15.3**	55,985	**21.8**
North Carolina	11	392	5.1	5,404	19.2
North Dakota					
Ohio	144	3,932	**15.4**	67,745	**24.1**
Oklahoma	15	207	**20.3**	1,808	**2.7**
Oregon	4	116	**20.8**	2,295	**22.9**
Pennsylvania	151	4,902	**15.8**	85,281	**23.6**
Rhode Island					
South Carolina	4	117	**.9**	1,364	**19.1**
South Dakota	6	81	**37.3**	1,151	**25.4**
Tennessee	23	1901	**4.6**	10,158	4.9
Texas	22	1,502	**7.9**	27,786	**9.2**
Utah	7	0160	**50.9**	2,158	**34.3**
Vermont	38	2,203	**7.3**	43,763	**17.9**
Virginia	28	962	**8.7**	13,105	**18.0**
Washington	17	614	**12.9**	10,766	**14.0**
West Virginia	19	922	**9.8**	14,829	**21.7**
Wisconsin	14	384	**60.7**	7,135	**104.5**
Wyoming					
Totals	1,152	36,879		$630,480	

Cement Industry.—In the cement industry the employment index was 57.6 in May, 59.1 in June, and 58.4 in July (Table IV). These are monthly increases of 20.0 per cent. for May over April, 2.6 per cent. for June over May, and a loss of 1.2 for July from June. Actual employment was 17,593 workers in 122 plants in May, 19,459 in 131 plants in June, and 19,158 in 129 plants in July. The gains over the same month a year ago were 27.1 per cent. in May, 42.2 per cent. in June, and 16.3 per cent. in July.

The one-week pay-roll index, which was 30.6 in April, rose to 35.8 in May (a 17.1-per cent. increase) and to 39.9 in June (an 11.4-per cent. increase), and fell 1.9 per cent. to 39.1 in July. Compared with the same months of 1933, May showed an increase of 68.1 per cent., June an increase of 57.7 per cent., and July an increase of 40.6 per cent.

In May the per-capita weekly earnings were $18.92, the highest in a year

(Continued on page 51)

Table IV.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
1933																		
July	122	16,072	46.1	**7.9**	**13.5**	$274,777	25.7	**9.8**	**6.6**	$17.10	**1.8**	6.3	38.9	1.5	.....	43.9c.	**3.4**	.....
August	111	15,787	48.8	**5.8**	**28.4**	287,508	29.5	**15.0**	**26.1**	18.21	**8.7**	1.5	36.0	7.4	.....	50.2c.	**17.0**	.....
September	129	15,545	44.0	9.7	**5.0**	256,836	23.9	19.0	2.4	16.52	10.4	7.3	31.8	11.6	.....	52.2c.	**3.9**	.....
October	131	13,119	38.0	13.7	11.4	240,984	22.9	4.5	9.1	18.37	**10.7**	**2.1**	34.5	**8.4**	.....	54.3c.	**4.0**	.....
November	113	10,071	37.8	.4	7.8	177,760	21.2	7.1	8.6	17.65	6.7	.8	32.0	7.2	.....	52.8c.	2.7	.....
December	129	10,851	33.6	11.3	**2.1**	172,067	17.6	17.1	**2.3**	15.86	6.6	**.2**	28.5	10.9	.....	54.2c.	**2.6**	.....
1934																		
January	121	9,495	32.6	2.8	**8.7**	164,507	17.9	**1.7**	**19.3**	17.33	**4.6**	**9.3**	31.4	**7.9**	.....	55.7c.	1.1	.....
February	125	12,745	37.6	**15.2**	**26.6**	212,111	20.8	**16.2**	**39.6**	16.64	**.8**	**10.2**	30.8	**4.1**	.....	53.1c.	1.7	.....
March	120	13,023	42.4	**3.4**	**30.1**	224,218	24.1	**7.0**	**46.1**	17.22	**3.5**	**11.7**	31.9	**4.6**	10.6	53.6c.	**.2**	**29.9**
April	119	12,414	48.0	**13.3**	**24.0**	245,774	30.6	**27.0**	**65.4**	19.80	**12.1**	**33.3**	35.3	**7.6**	**3.6**	55.5c.	**3.7**	**33.3**
May	122	17,593	57.6	**20.0**	**42.2**	332,867	35.8	**17.1**	**68.1**	18.92	2.4	**18.3**	33.2	3.5	13.0	56.8c.	**2.2**	**39.0**
June	131	19,459	59.1	**2.6**	**27.1**	395,590	39.9	**11.4**	**57.7**	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	129	19,158	58.4	1.2	**16.3**	387,041	39.1	1.9	**40.6**	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers are based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.

Latest Portland-Cement Statistics

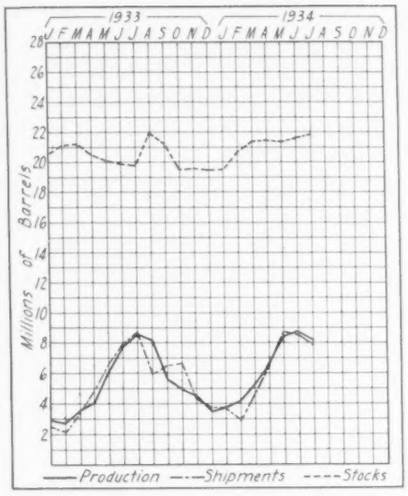


Chart showing monthly production, shipments and stocks on hand at end of month from January, 1933, to July, 1934.

THE Portland cement industry in July, 1934, produced 8,134,000 bbl., shipped 7,893,000 bbl. from the mills, and had in stock at the end of the month 21,842,000 bbl. Production in July, 1934, showed a decrease of 5.5 per cent. and shipments a decrease of 9.2 per cent., as compared with July, 1933. Stocks at mills were 10.0 per cent. higher than a year ago. The mill value of the shipments—35,163,000 bbl.—in the first half of 1934, is estimated as $53,602,000.

In the following statement the total output of finished cement is compared with the estimated capacity of 163 plants at the close of July, 1934, and of 164 plants at the close of July, 1933.

RATIO (*per cent.*) OF PRODUCTION TO CAPACITY

	July		June	May	April
	1933	1934	1934	1934	1934
The month	37.6	35.7	39.8	37.5	29.6
The 12 months ended	26.3	26.9	27.1	26.7	25.9

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1933 AND 1934 (*In thousands of barrels*)

Month	Production		Shipments		Stocks At End of Month	
	1933	1934	1933	1934	1933	1934
January	2,958	3,779	2,502	3,778	20,624	19,547
February	2,777	4,168	2,278	2,952	21,125	20,762
March	3,684	5,257	3,510	4,618	21,298	21,422
April	4,183	6,544	4,949	6,492	20,542	21,557
May	6,262	8,554	6,709	8,784	20,117	21,301
June	7,804	8,786	7,979	8,539	19,936	a21,600
July	8,609	8,134	8,697	7,893	19,848	21,842
August	8,223	.....	5,994	.....	22,078	.....
September	5,638	.....	6,517	.....	21,216	.....
October	5,037	.....	6,750	.....	19,502	.....
November	4,672	.....	4,463	.....	19,709	.....
December	3,526	.....	3,738	.....	a19,541	.....
Totals	63,373	.....	64,086	.....	.....	.....

a Revised.

DISTRIBUTION OF CEMENT (*a*)

Shipped to—	June		July		Shipped to—	June		July	
	1933	1934	1933	1934		1933	1934	1933	1934
Alabama	128,627	54,337	64,120	76,085	New Jersey	243,872	270,397	262,251	285,365
Alaska	924	2,229	1,959	2,856	New Mexico	7,737	25,889	15,563	25,090
Arizona	10,014	24,885	7,364	15,544	New York	1,070,796	1,049,819	1,161,461	978,403
Arkansas	b84,181	46,216	41,330	55,399	North Carolina	46,758	61,447	64,219	80,208
California	473,303	463,606	396,165	371,962	North Dakota	24,427	32,055	23,618	33,435
Colorado	34,690	45,758	41,755	64,350	Ohio	389,377	483,707	445,180	411,800
Connecticut	104,706	124,743	112,051	105,321	Oklahoma	150,303	136,378	122,487	115,418
Delaware	31,197	45,803	15,933	31,607	Oregon	43,263	36,042	22,860	52,380
Dist. of Col	94,539	88,735	97,056	94,185	Pennsylvania	659,913	566,807	687,614	584,073
Florida	54,942	65,270	50,788	54,516	Porto Rico	6,250	11,988	15,645	12,261
Georgia	37,634	55,443	63,813	91,422	Rhode Island	56,332	53,074	51,412	48,123
Hawaii	12,717	30,006	12,794	13,482	South Carolina	17,301	28,877	27,886	28,677
Idaho	11,586	29,229	10,144	21,717	South Dakota	19,494	37,917	34,892	41,909
Illinois	347,314	557,475	1,124,429	512,159	Tennessee	b107,669	121,763	86,048	101,964
Indiana	350,728	326,093	357,953	323,604	Texas	339,004	324,339	248,184	275,683
Iowa	187,840	297,842	210,017	237,122	Utah	17,867	28,513	26,258	18,483
Kansas	92,726	153,683	123,059	114,941	Vermont	18,735	43,224	26,815	25,367
Kentucky	179,813	122,911	152,711	125,254	Virginia	117,078	140,554	133,612	126,463
Louisiana	59,178	81,409	47,917	91,859	Washington	58,175	97,178	66,370	101,887
Maine	60,431	37,802	71,464	30,862	West Virginia	59,554	115,949	74,336	102,598
Maryland	78,909	137,133	93,838	161,833	Wisconsin	328,486	379,484	370,525	338,500
Massachusetts	220,410	192,352	223,632	191,942	Wyoming	8,377	20,369	9,904	15,394
Michigan	514,119	473,640	419,326	365,756	Unspecified	b30,745	5,811	0	63
Minnesota	235,967	171,954	192,668	202,247		7,881,231	8,499,883	8,641,177	7,857,078
Mississippi	89,638	63,418	72,004	79,266	Foreign countries	97,769	39,117	55,823	35,922
Missouri	317,173	216,904	369,385	177,605	Total shipped from cement plants	7,979,000	8,539,000	8,697,000	7,893,000
Montana	23,086	29,299	18,330	37,841					
Nebraska	135,231	185,585	78,106	95,554					
Nevada	61,124	231,532	136,152	262,265					
New Hampshire	27,171	73,010	57,774	43,978					

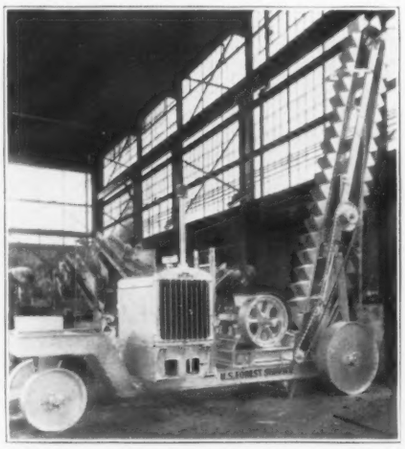
a Includes estimated distribution from 3 plants in June and July, 1933; from 2 plants in June and July, 1934. *b* Revised.

U. S. Forest Service Buys Portable Crushing Plants

The United States Forest Service has purchased fourteen Cedar Rapids crushing plants, which will be used for crushing local rock and gravel for the surfacing of roads in parks and reserves. One has been shipped to Kemmerer, Wyo., one to Richfield, Utah, and the third to Cedar City, Utah.

The company has also recently sold additional Cedar Rapids portable plants to the government which have been shipped to the following points: Lanesboro, Vt.; Mansfield, Crocker, Fremont and Salem, Mo.; Walhalla, S. C.; Berea, Ky.; Gainesville and Lakemont, Ga.; Hot Springs, N. C.; Coche, Oklahoma.

Each plant consists of a Cedar Rapids 10-in. by 20-in. jaw crusher mounted on a steel truck with a Climax H4B engine, which furnishes the power for driving the crusher and the 24-ft. folding elevator. The engine drives the crusher through a V-belt. Each plant includes a 36-in. by 7½-ft. revolving screen. All the equipment was built to comply with government specifications.



Type of portable plant furnished to U. S. Forest Service.

Labor Conditions (*from page 50*)

except in April. The decrease from that month was 2.4 per cent., but the change from a year ago was an 18.3-per cent. increase. The average hours worked per week was 33.2, which is 3.5 per cent. below April and 13.0 per cent. below 1933. Average hourly earnings reached a new "high" for the year, 56.8c., 2.2 per cent. above April and 39.0 per cent. above May, 1933.

Seven establishments made wage-rate increases effective in May (Table V) and these changes affected 1,221 workers. May was the second month, following a 5-month period of wage-rate stability, in which increases were reported.

Lime Shipments

LIME shipments in May reached the highest point since September, 1933 (Table I). A total of 163,093 tons of lime was shipped in May, of which quicklime represented 101,246 tons and hydrated lime 61,847 tons.

The bulk of the output was shipped for chemical uses, which took 106,676 tons, or 65.4 per cent. of the total. Shipments of agricultural lime amounted to 30,356 tons, or 18.6 per cent., and those of building lime to 26,061 tons, or 15.9 per cent. of the total. May shipments of chemical lime were exceeded, since last September, only by those of March (110,070 tons), those of building lime by April shipments (27,007 tons), and those of agricultural lime also by the April figure (32,935 tons).

Prices continued to improve, the average values of agricultural, building and chemical lime having been respectively $8.53, $10.57 and $6.76 a ton in May (Table II). The average per-ton value of all lime was $7.70, an increase of 4c. over the April figure and of 20c. over the March value. The record "low" since last September occurred in December, when the average value was $6.72, or 98c. below the May figure (Table III).

Bulk quicklime in May averaged $6.19 a ton, and ranged from $5.68 in the case of agricultural lime through $6.11 for chemical lime to $8.13 for building lime. The value of quicklime in barrels averaged $17.24, agricultural lime being valued at $17.50 and chemical lime at $16.90, with building lime in between at $17.27. Bagged quicklime was valued at $7.93 for the agricultural kind, at $8.97 for the chemical, and at $12.07 for the building, an average of $9.73.

Hydrated lime averaged $8.54 a ton, $8.28 for chemical, $8.52 for agricultural, and $8.99 for building.

The ratio of shipments to capacity was 42.4 per cent. in May, the highest figure in 8 months and 4.7 per cent. above April (Table III). The ratio was 23.0 per cent. in District 15 (California, Nevada, Utah, Arizona, Colorado and New Mexico) and 56.3 in District 3 (West Virginia, western New York and western Pennsylvania). Shipments in District 2 (New Jersey, Delaware, Maryland and eastern Pennsylvania) were 50.3 per cent. of capacity.

Table I.—SHIPMENTS OF LIME IN 1933 AND 1934, BY KINDS AND USES (*tons*)

Month	Kinds[1]	Uses			Totals
		Agriculture	Building	Chemical	
1933					
October	Quicklime	1,747	8,078	64,529	74,354
	Hydrate	5,240	10,674[2]	19,550	35,464
	Totals	6,987	18,752	84,079	109,818
November	Quicklime	932	7,971	59,292	65,195
	Hydrate	2,379	9,414[2]	20,000	31,793
	Totals	3,311	17,385	79,292	99,988
December	Quicklime	563	5,817	68,242	74,622
	Hydrate	3,240	8,053[2]	20,208	31,501
	Totals	3,803	13,870	88,450	106,123
1934					
January	Quicklime	547	7,544	71,359	79,450
	Hydrate	3,171	11,062[2]	18,029	32,262
	Totals	3,718	18,606	89,388	111,712
February	Quicklime	601	5,384	75,561	81,546
	Hydrate	2,435	7,238[2]	19,715	29,388
	Totals	3,036	12,622	95,276	110,934
March	Quicklime	2,541	9,538	85,918	97,997
	Hydrate	9,695	10,570[2]	24,152	44,417
	Totals	12,236	20,108	110,070	142,414
April	Quicklime	5,945	12,531	75,187	93,663
	Hydrate	26,990	14,476[2]	20,722	62,188
	Totals	32,935	27,007	95,909	155,851
May	Quicklime	5,136	11,565	84,545	101,246
	Hydrate	25,220	14,496[2]	22,131	61,847
	Totals	30,356	26,061	106,676	163,093

[1] Do not include the following miscellaneous lime: November, 608 tons; December, 1,737 tons; January 725 tons; February, 572 tons; March, 1,285 tons; April, 3,136 tons; May, 3,595 tons.
[2] Does not include finishing lime.

Table II.—SHIPMENTS OF LIME IN MAY, 1934, BY KINDS AND USES

Kinds[1]	Agriculture		Building		Chemical		Totals[1]	
	Amount (*tons*)	Value Per Ton	Amount (*tons*)	Value Per Ton	Amount (*tons*)	Value Per Ton	Amount (*tons*)	Value Per Ton
Quicklime:								
In bulk	1,442	$ 5.68	3,903	$ 8.13	79,449	$ 6.11	84,794	$ 6.19
In barrels	704	17.50	4,019	17.27	901	16.90	5,624	17.24
In bags	2,990	7.93	3,643	12.07	4,195	8.97	10,828	9.73
Hydrate	25,220	8.52	14,496[2]	8.99	22,131	8.28	61,847	8.54
Totals or averages	30,356	8.53	26,061	10.57	106,676	6.76	163,093	7.70

[1] Do not include 3,595 tons of miscellaneous lime.
[2] Does not include finishing lime.

Table III.—SHIPMENTS AND VALUE OF LIME AND RATIO OF SHIPMENTS TO CAPACITY IN 1933 AND 1934, BY MONTHS

Month	Total Capacity of Concerns Reporting[1] (*tons*)	Shipments Reported (*tons*)	Average Value Per Ton	Ratio of Shipments to Capacity (*per cent.*)												
				United States	Districts											
					1	2	3	4	5B	6-8-9	7	10-11	12	13	14	15
1933																
October	347,446	109,818	$6.84	31.6	15.6	26.1	48.6	32.5	26.1	20.9	46.6	35.5	29.7	21.8	38.2	17.9
November	392,947	100,596	7.01	25.6	15.1	20.0	32.0	22.3	24.2	18.5	37.6	34.4	22.2	26.3	23.2	18.4
December	390,553	107,860	6.72	27.6	17.7	16.3	40.0	21.1	27.9	15.2	41.1	33.8	25.9	22.9	20.3	19.6
1934																
January	392,636	112,437	7.31	28.6	12.2	19.4	39.6	26.3	33.0	23.8	38.1	43.0	36.1	23.4	17.4	17.1
February	406,215	111,506	7.17	27.4	9.7	19.3	35.7	25.5	38.4	18.3	35.9	37.2	42.9	25.5	26.2	18.5
March	392,806	143,699	7.50	36.5	15.5	35.1	47.8	40.4	31.7	25.3	48.2	40.3	49.4	24.7	52.4	26.4
April	391,860	158,987	7.66	40.5	24.4	55.4	53.0	50.7	38.9	29.2	43.7	39.1	44.9	26.5	24.8	20.4
May	393,217	166,688	7.70	42.4	26.9	50.3	56.3	49.4	37.3	28.7	49.8	46.7	36.8	28.7	25.1	23.0
June																
July																
August																
September																

[1] Idle capacity reported as follows: October, 27,414 tons; November, 18,673 tons; December, 12,679 tons; January, 12,687 tons; February, 14,150 tons; March 7,313 tons; April, 3,564 tons; May, 6,397 tons.

Foreign Developments

Extends Use of Emley Test for Free Lime

Investigations by V. Rodt of the State Material Testing Bureau at Dahlem, Berlin, reported in *Zement* for July 26 (23:429-435), show that the Emley test for the determination of free lime yields correct results even if slight amounts of water are present (up to 1 cc.) in the alcohol-glycerine mix, and that the Emley method is less sensitive to water in these small quantities than Rathke's proposed modification of the test.

Also, the test was found capable of application to the testing for free lime in mixtures containing trass, if the concentration of the phenolphthalein solution is increased to 1 g. in 100 cc., and the final titration is carried on at room temperature to the conclusion.

Using the test in this manner the investigator found free calcium hydroxide yielded in general in the hardening of cement and mixtures of trass and cement and their mortars. The quantity diminishes after six months' storage, explained by the taking up of carbon dioxide. The quantities of free calcium hydrate in mixes containing blast-furnace slag (blast-furnace cements) are very small. The mixes containing trass have considerable quantities of free calcium hydrate.

In mixtures of trass and lime considerable quantities of calcium hydrate are combined. The combination with lime is similar in the cases of the different trasses and not exceptionally different in amount. The combination with lime in such cases shows slight agreement with the ability of the mixtures to harden, and it is suggested that the explanation of the hydraulic properties of lime and trass mixtures must be sought in other physical and chemical reactions of the trass.

Hydrated Lime Costly For Making Cement

The use of hydrated lime instead of limestone in the production of Portland cement has, at first glance, many attractive advantages: elimination of the need for dissociating carbon dioxide from the carbonate, increased surface of calcium components in the raw mix, and others. These advantages are offset by the disadvantage of increased amounts of water to be driven off in the kiln. The only practical occasion for using the hydroxide is in the utilization of lime wastes from various processes, and earlier writers have laid great stress on the disadvantage caused by the excess of water.

In an investigation by the writer it was found that even when slurry made with lime is put through a filtering process, it is more expensive to burn than slurry made with limestone. However, the investigation disproved the older belief that the removal of lime in the filtering process makes it difficult to control the composition of the raw mix. Also, he found that the raw mix, when using the hydrate, does not harden (that is, of course, unless hydraulic limes are used) within any period of time that would elapse in normal operation.—Ing. Hess in *Zement* 23:445-448, Aug. 2, 1934.

Course of Reaction of Lime, Silica Studied

On the basis of several researches and earlier publications of other investigators, the authors picture the course of reactions when lime and silica are heated together in this manner:

At the surface of contact of CaO crystal with a particle of silica in ordinary operation there forms first a thin crystal layer of orthosilicate over an amorphous "skin" where the reaction is going on. For further reaction to set in it is necessary for the CaO (which, as a number of facts establish, is more mobile than the SiO_2) to diffuse through the $2CaO.SiO_2$. As long as there is still a large excess of CaO and the temperature is sufficiently high, the diffusion takes place so rapidly that it leads not at all, or only to a slight degree, to the formation of a compound of lower basicity at the plane between orthosilicate and silica. As long as the temperature is not over 1,300 deg. C. it is likewise impossible, or possible only to a slight degree, for the compound of highest basicity, $3CaO.SiO_2$, to form at the plane of contact between CaO and $2CaO.SiO_2$, because the conditions for its genesis are extremely bad.

But if no excess of lime is present, or the temperature is too low and consequently the possibility of diffusion too low, then the free lime soon becomes scarce at the surface of contact between the orthosilicate and silica and it becomes possible for $3CaO.2SiO_2$ and $CaO.SiO_2$ to form. Then when all the lime has disappeared the metasilicate increases more and more through diffusion of CaO out of the orthosilicate in the direction of $3CaO.2SiO_2$ and $CaO.SiO_2$ to the SiO_2. Thus the orthosilicate gradually vanishes and finally also the $3CaO.SiO_2$, leaving, if free silica is still present, only wollastonite.—Wilhelm Jander and Erna Hoffmann in *Zeitschrift für Anorganische und Allgemeine Chemie* 218:211-223 (1934) and *Tonindustrie-Zeitung* 58:718, July 23, 1934.

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Investigates Reactions Due to $CaCl_2$ in Cement

Numerous investigations on the action of calcium chloride on cement have established the deteriorating action of solutions on hardened cement, and, on the other hand, the beneficial effect of small quantities of calcium chloride admixed in the mixing water on the strength of the concrete and a quicker set.

In the present investigation the writer examined the chemical changes that take place in the cement in the presence of calcium chloride. The experimental data developed lead him to several interesting conclusions (which the editors of the journal do not, however, believe fully justified):

(1) Action of a concentrated calcium-chloride solution on tricalcium-oxychloride results in the formation of the monoxychloride, crystallizing in hexagonal pyramids, taking $CaCl_2$ into combination and releasing calcium hydroxide, in accordance with the equation: $3CaO.CaCl_2 + CaCl_2 (+ H_2O) = 2(CaO.CaCl_2) + CaO (+ H_2O)$.

(2) The investigations conducted do not lead to the assumption of the formation of a calcium chloroaluminate (Friedel) in the action of calcium chloride on cement or lime and calcium aluminate, rather, oxychlorides high in chloride.

(3) Strontium chloride would yield only the monoxychloride $SrO.SrCl_2$, and that in two different crystal forms (quadratic tables and rhombohedrons).

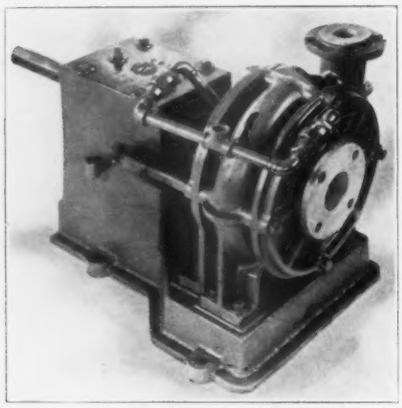
(4) The amounts of calcium chloride combined by cement, etc., can be determined quantitatively by titration with silver solution.

(5) On these considerations the chloride unsoundness of cement could be explained through the pressure of crystallization in the momentary crystallization of the calcium trioxychloride occurring when the calcium-chloride solution comes in contact with the lime in cement; of secondary importance, also, the conversion of the trioxychloride to monoxychloride which soon sets in.—Dr. P. Mecke in *Tonindustrie-Zeitung* 58-689-690, 700-701 and 713-715, July 16, 19 and 23, 1934.

New Machinery and Supplies

Rubber Protects Metal Parts of Sand Pump from Abrasion

The Allen-Sherman-Hoff Co., Philadelphia, Pa., announces the Hydroseal Maximix protected sand pump for which it is claimed that none of the abrasive material pumped can wear or even touch any metal part of the pump. This pump incorporates the Hydroseal pumping principles with Maximix rubber protection. The impeller and the entire pump casing are moulded of this rubber, the metal shell merely serving to hold the rubber casing in place. These parts are easily replaced in the field as no vulcanizing is required and they cannot leak so no abrasives can collect between the metal and the rubber parts. All metal parts of this pump, except the



Rubber-lined sand pump.

bearings, shaft, etc., are made of aluminum alloy.

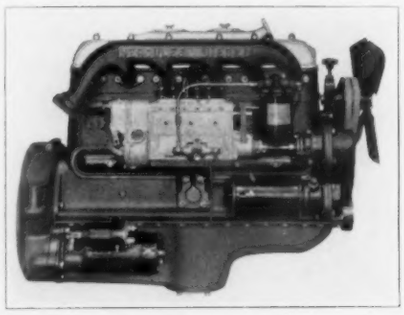
The base plate, bearing plate and lower bearing housing are integrally cast and the base plate carries the pump and driving unit (if the pump is direct-connected) on machined pads. The pump shaft is of cold drawn steel with a steel disc shrunk thereon to resist thrust in either direction. The impeller is of the three-blade type made up with a cast steel hub disc, three synthane spacers, a mild steel shroud plate and two chrome-nickel wearing plates held together by bolts. The Maximix rubber has a unique self-clamping construction.

The pump shell is a well-ribbed grey iron casting into which fits the one-piece rubber shell liner with its edges carried out to form the gasket between the casing and the two side plates; also to form the gasket between the discharge outlet and the discharge piping. The side plates are grey iron castings lined with Maximix sheet rubbers. In the "C" type of pumps the sides of the impellers are also covered with rubber making the peripheral seals unnecessary. These pumps are made in sizes to meet all requirements.

Diesel Unit Interchangeable with Maker's Gasoline Engines

The Hercules Motors Corp., Dayton, O., announces an addition to their 6-cyl. Diesel engines, the Model DXRB. This engine has a displacement of 474 cu. in. and an N.A.C.C. rating of 45.9 hp. and develops 120 hp. at 2,000 r.p.m. It interchanges with the Hercules gasoline engines known as the YX and RX series in installation measurements.

This engine is a full Diesel of the auxiliary combustion chamber type which controls the burning of the fuel. Both the crankshaft and camshaft are carried



Interchangeable Diesel engine.

on seven bearings and main and connecting rod bearings are removable steel shells lined with high-lead bronze, capable of carrying high pressures and temperatures. Aluminum alloy pistons are used and connecting rods are of heat-treated chrome nickel molybdenum steel rifle drilled for wrist pin lubrication. Wet type removable sleeves are used for cylinder liners.

Lubrication is forced feed to all main and connecting rod bearings, wrist pins, timing gears and the overhead valve mechanism and the splash from the rod bearings lubricates the cylinder walls. The crankcase and cylinder are cast integral of special iron alloy. As is the usual Hercules practice this engine is also built into complete power units, either fully-enclosed or open types, and can also be converted for marine use.

Portable Plants Designed to Supplement Stationary Units

The Traylor Engineering & Mfg. Co., Allentown, Pa., has developed a series of portable plants designed to help the commercial producer of crushed stone to take advantage of local conditions more or less remote from their stationary plants. While the general idea involved is not new these plants use a small gyratory crusher which is new although it involves some of the features of the Traylor TZ crusher. The jaw crusher used also has a new welded steel plate frame. Two types of plants are offered, one for level sites and the other for hillside setups.

The level site plant comprises a jaw crusher whose product is carried by a bucket elevator to a vibrating screen located on top of a steel storage bin. Oversize from the screen is spouted to a Type TY reduction crusher that also delivers its output to the elevator. This plant is operated by a 20-hp. electric motor for the reduction crusher and a 40-hp. motor for the balance of the equipment.

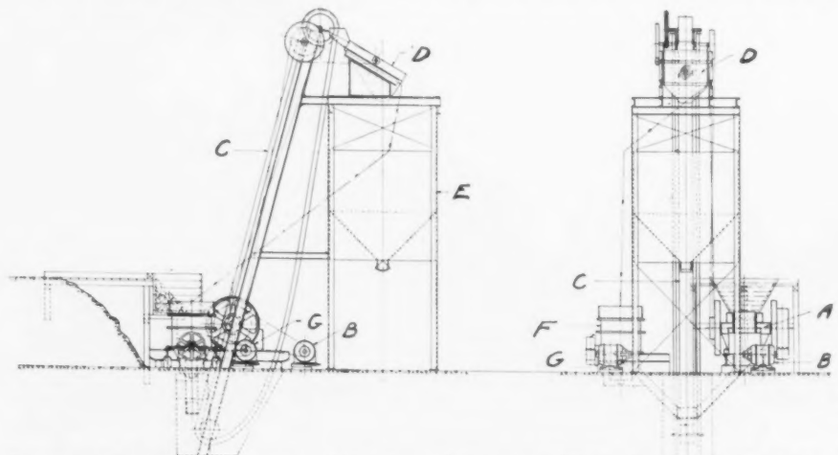
The hillside plant uses the same crushers but the stone is handled by conveyors instead of elevators. A belt conveyor takes the product of the primary jaw crushers to a belt conveyor feeding the Traylor shaking screen. Oversize goes by belt conveyor to the reduction crusher which feeds back to the primary conveyor. This plant is operated by five electric motors, a 5-hp. for each of the conveyors and the screen, a 20-hp. for the reduction crusher and a 30-hp. for the jaw crusher.

In both plants the crushers are mounted on steel skids which are provided with means for attaching suitable wheels and axles for transportation from place to place. The storage bin used is made entirely of steel and is fabricated in such a manner that it may be bolted together or knocked down easily and quickly. A suitable bottom-discharge gate is supplied. In either plant individual oil engines may be substituted for electric motors or a line shaft may be used to drive the plant, deriving its power from a single oil engine or other motive power. These plants are designed for medium capacity, using a 15-in. by 24-in. primary crusher. For operators desiring plants of greater capacity, however, similar plants using a 24-in. by 36-in. primary crusher are offered with other equipment proportionate in size. Such plants, it is said, would have capacities of 50 to 60 tons per hour.

Blasting Machine Fires Two Consecutive Series of Shots

The Atlas Powder Co., Wilmington, Del., announces the development of the "Twin Fifty" blasting machine which not only has capacity to fire one hundred electric blasting caps but has other unique features which enable the blaster to secure greater effectiveness.

Blasting machines such as the Atlas No. 3 with a specially designed shunt winding have ample power to fire fifty 30 ft. copper wire electric blasting caps if the blasting machine is operated correctly and the entire blasting cap circuit has sufficient insulation to prevent current leakage. By the design of a special double switch and the addition of a third binding post to the Atlas No. 3 blasting machine it has been possible to utilize the unused current to fire a second series of electric blasting caps. The only additional equipment required is an extra leading wire. The firing of the second series follows the first so closely that the time interval between



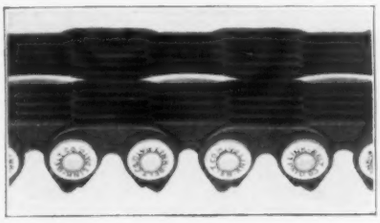
Elevation of portable plant showing: (A) primary jaw crusher; (B) crusher motor; (C) bucket elevator; (D) vibrating screen; (E) storage bin; (F) gyratory crusher; (G) crusher motor.

the firing of the two series cannot be detected by ear and the two series seem to fire as one.

In certain kinds of blasting such as fill settlement and some quarry blasting it is said to be sometimes possible to take advantage of this time interval and fire one row of bore holes a very small fraction of a second before another, thereby obtaining improved results. The change in the blasting machine in no way interferes with its use to fire a single series.

Silent Chain Drive Given Distinctive Color Treatment

The Link-Belt Co., Chicago, Ill., announces that it has improved the appearance of the silent-chain drive which it has been manufacturing for the past 32 years by bluing most of the chain and treating



Silent-chain drive.

the washers and guide bars to give them a silvered appearance. The trade name Silverstreak has been adopted. It is made in all standard types, for both industrial first reduction drives and automotive silent timing.

Paper-Lined Cloth Bags Are Sealed with Cement Strips

The Bemis Bro. Bag Co., St. Louis, Mo., has developed a new closure for the sealing of paper-lined cloth bags which employs a cemented strip applied by machine over the open end of the bag. The cement is entirely waterproof and sets instantly. Easy opening and easy handling of the bags are said to be features of the new method. This machine will seal from four to six bags per minute.

Develops Special Type Hose for Portable Air-Compressors

In order to meet a wide range of requirements the Electric Hose & Rubber Co., Wilmington, Del., has developed two new types of air hose, each especially suited to a distinct field. The Electric portable compressor hose is designed for direct connection to portable air compressors or for other service where excessive amounts of oil may be blown into the hose. This hose has a lining of a special compound which is said to be resistant to internal heat and is not affected by constant contact with oil.

The Electric rock drill hose was developed especially for service in mines, quarries, etc., where it receives rough usage. It is covered with an extra-heavy layer of rubber especially compounded and cured to resist abrasion and cutting action. Both of these new types of hose are reinforced by strong, tightly-twisted cords spirally braided around the tube and completely surrounded by rubber.

New 1½- and 2-Ton Trucks in Different Wheelbases

The Federal Motor Truck Co., Detroit, Mich., has entered the lower price field with 1½- and 2-ton chassis. These new trucks have a maximum gross rating of 10,000 lb. for the 1½-ton, when equipped with dual rear tires, and 11,000 lb. for the 2-ton. Standard chassis weights are 3,500 lb. and 3,800 lb., respectively. Both models are built with wheel-base lengths of 137, 153, 162 and 174 in., and the 2-ton chassis is also available with a 187-in. wheelbase.

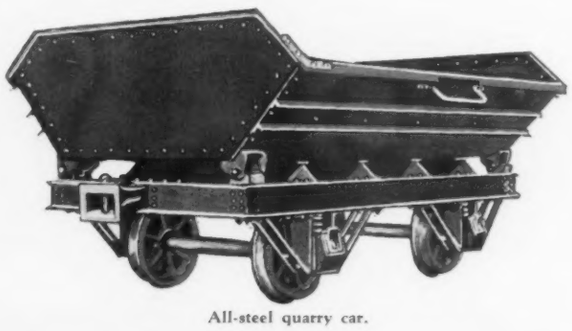
These trucks are similar in appearance to other Federal models. The 6-cylinder power plant is of the L-head type with seven main bearings. With a 3¾-in. bore and a 4¼-in. stroke 62 hp. is developed at 2,600 r.p.m. The piston displacement is 228 in. in this engine, but a larger engine of 263 cu. in. displacement can be furnished on the 2-ton model. The engine has a gear-driven water pump and full-pressure lubrication, down-draft carburetion, valve-seat inserts, gear-driven generator and other features. An oil-filter and air-cleaner are standard equipment. Both models are equipped with full-floating rear axles and hydraulic brakes.

Helmet Designed for Wide Vision Range and Comfort

The W. W. Sly Manufacturing Co., Cleveland, O., manufactures the Sly Pur-air helmet which is said to combine unusual comfort with wide range of vision. This helmet, which weighs only 5 lb., has an adjustable sweat band and fits the head like a cap. The head rest is padded with soft sponge rubber and part of the weight is carried on the wearer's shoulders, chest and back. The air entering the helmet passes through a filter and purifier. One section of the purifier acts as a water and oil separator with a drain cock at the bottom and the other is a renewable cartridge which prevents, by the use of gauze and charcoal, the entrance of vapor, fumes, odors, and finely divided solid matter. The helmet hood of seamless elastic rubber extends over the shoulder and is held in position by adjustable straps and hooks which are fastened to a belt. A large single window is covered with glass sealed against a soft sponge rubber gasket and held in place by a metal screen which slides in grooves.

Columbus Foundry Begins Manufacture of Quarry Cars

The Chase Foundry & Mfg. Co., Columbus, O., announces a complete line of mine and quarry cars of steel or reinforced wood construction and with either anti-friction or plain-bearing wheels. The two-way side-dump car is built to withstand severe service and, it is said, will haul more than twice its own weight. Shock is absorbed by a 3-in. oak filler between the false and main bottom plate of the body, and the double-coil springs on which the body is mounted.



All-steel quarry car.

Flexible Coupling Uses 5 to 22 Flexible Elements

A new flexible coupling which is said to form a simple, positive, yet flexible connection between motor or engine and driven machinery in general industrial service has been developed by Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Its cushioning action protects both driving and driven equipment against injury from shocks or vibration, and helps to absorb starting or momentary overloads. It also compensates for slight misalignment.

The coupling, Type WH, consists of two identical cast steel flanged halves, two sheet steel cover plates, two snap or retaining rings and from five to twenty-two flexible elements, depending on size. Machined radially around the periphery of each flange are rectangular slots to receive

Flexible coupling assembly

the cushioning and torsionally flexible elements. The torque transmitting element is a rectangular steel plate, and the cushioning elements are made from a high grade hydraulic packing. In assembly, the torque elements are placed in the center of a slot with a cushioning element on each side. Thus the cushioning elements are subjected only to compression under load.

The flexible elements and the periphery of the coupling flanges are provided with a groove, into which snap rings are inserted, preventing radial or lateral movement of the elements. Each coupling half is provided with a smooth steel cover, held securely in place by oval head countersunk machine screws, eliminating projecting parts.

The flexible elements can be removed and replaced without disturbing the coupling flanges, or the driving or driven equipment, by simply disconnecting the cover plates from the flanges, and removing the snap rings. The elements can then be readily taken out and replaced. There being no metal to metal contact of wearing parts, lubrication is unnecessary. Since the coupling is machined all over, it is well balanced, and, it is said, can be used safely for speeds up to 8,000 feet per minute.

Bucyrus-Erie Co. Makes Many Personnel Changes

The Bucyrus-Erie Co., South Milwaukee, Wis., announces the advancement of P. H. Birckhead to general sales manager following the combination of domestic and foreign sales departments. Carl S. Wagner, formerly a vice president of the Koehring Co., has become associated with the company as manager of the commercial department in charge of sales promotion, publicity, orders, claims and adjustments, and field direction. M. J. Woodhull has been named manager of large machine sales and J. A. Garber manager of small machine sales; J. B. Birckhead, drill and "Loadmaster" sales; M. F. Keese, dredge sales; R. T. Craig, foreign and export sales; and B. F. Johnston, repair sales.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Agitating Ladders (Dredge)
*Eagle Iron Works
Pettibone Mulliken Co.

Air Compressors (Portable)
Chrysler Corp.; Amplex Division
Fuller Co.

Air Compressors (Stationary)
Fuller Co.

Air Pumps
Fuller Co.

Air Separators
Gay, Rubert M.
*Gruendler Crusher & Pulv. Co.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Automatic Feeders
*Bartlett & Snow Co., C. O.
Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Automatic Weighers
*Bartlett & Snow Co., C. O.
Fuller Co.

Balls (Grinding)
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Baskets (Dipping)
Buffalo Wire Works Co.

Bearings (Anti-Friction)
*Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Link-Belt Co.
Sprout, Waldron & Co.

Bearings (Oil-Less)
Chrysler Corp.; Amplex Division

Belting
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Self-Vulcanizing Rubber Co.
Sprout, Waldron & Co.

Belting (Multiple V)
Goodyear Tire & Rubber Co.

Bin Gates
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Fuller Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
*Bartlett & Snow Co., C. O.
Diamond Iron Works.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Sprout, Waldron & Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
Atlas Powder Co.
Du Pont de Nemours & Co.

Blasting Supplies
Atlas Powder Co.
Du Pont de Nemours & Co.
*Ensign-Bickford Co.

Blocks (Sheave)
Haiss Mfg. Co., Geo.
Sprout, Waldron & Co.

Bodies (Motor Truck, Concrete Mixing)
*Bartlett & Snow Co., C. O.

Borings, Core
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Bronze Work (Ornamental)
Buffalo Wire Works Co.
National Wire Cloth Co.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Pettibone Mulliken Co.

Buckets (Dragline—Cableway)
*Bartlett & Snow Co., C. O.
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.

Buckets (Elevator and Conveyor)
*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bulk-Cement Storage Plants
Sprout, Waldron & Co.

Cableways
*American Steel & Wire Co.
*Link-Belt Co.

Caps (Blasting)
Atlas Powder Co.
Du Pont de Nemours & Co.

Capstans (See Winches and Capstans)

Car Dumpers
*Link-Belt Co.

Car Pullers
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Carriers
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Car Wheels — (See Wheels — Car)

Castings
*Bartlett & Snow Co., C. O.
*Eagle Iron Works
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete-Mixing Plants (Complete)
*Bartlett & Snow Co., C. O.
Sprout, Waldron & Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Chutes and Chute Liners
*Bartlett & Snow Co., C. O.
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Sprout, Waldron & Co.

Classifiers
Deister Machine Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.

Clips (Wire Rope)
*American Steel & Wire Co.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Gay, Rubert M.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Cones (Sand-Washing)
*Bartlett & Snow Co., C. O.
*Link-Belt Co.
Smith Engr. Works

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works.
Fuller Co.
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.
*Universal Crusher Co.
Universal Road Machy. Co.

Conveyors (Ready-Mixed Concrete)
*Bartlett & Snow. Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Coolers (See Kilns and Coolers —Rotary)

Couplings (Flexible and Shaft)
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Link-Belt Co.
*Michigan Power Shovel Co.
Ohio Power Shovel Co.

Crusher Parts
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Pettibone Mulliken Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
*Dixie Machy. Mfg. Co.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Universal Crusher Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
*Universal Crusher Co.
Universal Road Machy. Co.

Crushers (Ring)
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

Detonators
Atlas Powder Co.
Du Pont de Nemours & Co.

Diesel Engines (See Engines—Diesel)

Dippers and Teeth (Power Shovel)
Pettibone Mulliken Co.

Dragline Cableway Excavators
*Link-Belt Co.

Dragline Excavators
*Link-Belt Co.
*Michigan Power Shovel Co.
Ohio Power Shovel Co.

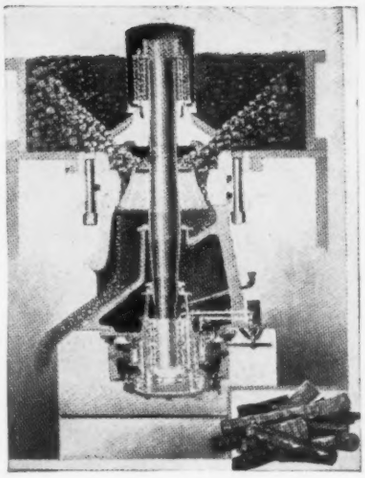
Dredges
Hetherington & Berner, Inc.
*Morris Machine Works

Drilling Contractors
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills (Core)
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills, Diamond
Mott Core Drilling Co.
Pennsylvania Drilling Co.

*** See also information in the 1934 Pit and Quarry HANDBOOK.**



GREATER TONNAGE with HALF THE POWER COST *Guaranteed!*

The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by belt from a standard motor.

The Savings Effected with this crusher are astounding:

In cost of Maintenance.....80%

In Power.....The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 15 hp., follows:

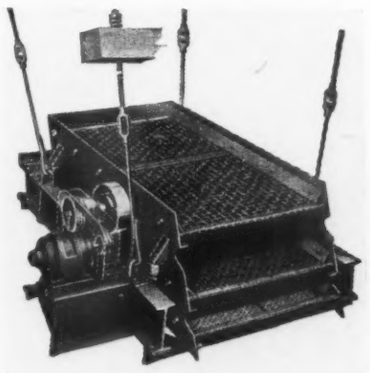
Minus ⅜ in	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%

KENNEDY VIBRATING SCREEN

Double Strength

High-Class Workmanship and Material

Greatest Capacity Guaranteed



No repair parts sold after 4 years in use except screen cloth

Write today for our Catalog No. 16-P-834

KENNEDY-VAN SAUN MFG. & ENG. CORP.

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with an Application of SELFVULC

EVEN if your old conveyor belt is worn down to canvas like the one shown above—DON'T THROW IT AWAY!

Resurface it with SELFVULC—the Self-curing Plastic Rubber Compound—and you will have a belt as good as new that will last as long as the original.

Scores of plants are reducing replacement costs by the use of SELFVULC to stop the ravages of abrasion and corrosion. Here is what one user writes:

"During the past three years that we have been using SELFVULC, we have not had to purchase any new belts. Our expense for replacements averaged about $7,000 per year, but since using your material, there has been a saving of 60% to 75% annually."—Moulding-Brownell Corp., Chicago.

Selfvulcanize to economize in lining chutes, hoppers and agitators, covering pipes, cables and surfaces exposed to wear in flumes, centrifugal pumps, tube mills, separators, dredging equipment and conveyors.

SELF-VULCANIZING RUBBER CO., INC.
605 West Washington Blvd.

Gentlemen:

Please send me your Bulletin on SELFVULC, and also full details of your TRIAL ORDER KIT containing supply of Plastic Rubber Compound and Primer with tools and instructions for applying.

MAIL COUPON FOR BULLETIN TODAY

NAME .....

ADDRESS .....

CITY ..... STATE .....

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 68

Drills (Rock)
*Jeffrey Mfg. Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.

Dust-Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Raymond Bros. Impact Pulv. Co.

Dust Conveying Systems
Fuller Co.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dust Hoods and Helmets
Pulmosan Safety Equipment Corp.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Engineers
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Fuller Co.
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*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Sprout, Waldron & Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Internal-Combustion)
Chrysler Corp.; Amplex Division

Engines (Steam)
*Morris Machine Works

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

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Haiss Mfg. Co., Geo.

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Atlas Powder Co.
Du Pont de Nemours & Co.

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*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
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Fuller Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Morrow Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.

Fencing (Woven Wire)
*American Steel & Wire Co.
Buffalo Wire Works Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
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Du Pont de Nemours & Co.
*Ensign-Bickford Co.

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Goodyear Tire & Rubber Co.

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*Link-Belt Co.

Gears (Herringbone)
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

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*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

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*Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.

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*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Pettibone Mulliken Co.
Smith Engr. Works

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*Bartlett & Snow Co., C. O.
National Wire Cloth Co.

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Hetherington & Berner, Inc.

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*Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.

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*Hendrick Mfg. Co.
*Link-Belt Co.

Hose (Air, Steam and Water)
Goodyear Tire & Rubber Co.
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Idlers
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Lime-Handling Equipment
*Bartlett & Snow Co., C. O.
Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

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*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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Liquid Rubber
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*Bartlett & Snow Co., C. O.
Fuller Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Locomotives (Electric, Gas and Steam)
*Lima Locomotive Works

Locomotives (Trolley-Battery)
*Jeffrey Mfg. Co.

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Manganese Steel
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Manganese Steel (Plates and Sheets)
Pettibone Mulliken Co.

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*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
Sprout, Waldron & Co.

Motor Trucks
General Motors Truck Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
Buffalo Wire Works Co.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Packings
Goodyear Tire and Rubber Co.
Self-Vulcanizing Rubber Co.

Partitions (Wire)
Buffalo Wire Works Co.
National Wire Cloth Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
Sprout, Waldron & Co.

Pipe Flanges
Hetherington & Berner, Inc.

Plastic Rubber
Self-Vulcanizing Rubber Co.

Plug Valves (See Valves)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
Barber-Greene Co.
Fuller Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Portable Crushing and Screening Plants
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works
*Jeffrey Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
*Universal Crusher Co.

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Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
*Bartlett & Snow Co., C. O.
Gay, Rubert M.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Pulverizers (See also Crushers; Mills; etc.)
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulv. Co.
*Universal Crusher Co.

Pump Valves (See Valves Pump)

Pumps (Air Lift)
Fuller Co.

Pumps (Bulk Cement)
Fuller Co.

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Vacuum)
Fuller Co.

Ready-Mixed Concrete Plants
*Bartlett & Snow Co., C. O.

Respirators
Pulmosan Safety Equipment Corp.

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

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More Capacity!

Lower Costs!

Positive Uniformity!

Greater Efficiency!

The capacity of grinding mills is materially increased by this new Gayco Centrifugal Air Separator. Fines are removed as they are made.

It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

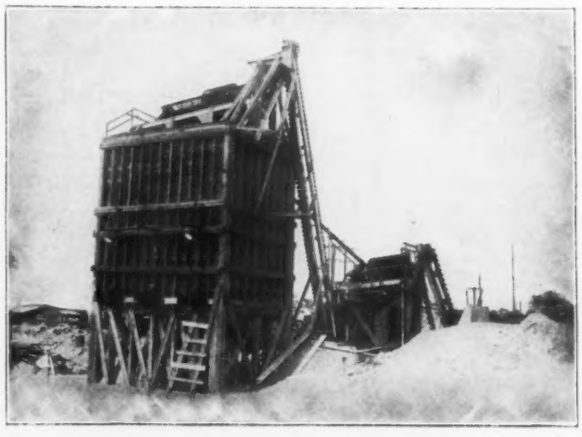
It is slow speed, requiring very little power. Repair costs are practically nothing—the only wearing parts are the steel cut gears and bearings enclosed in a dust proof casing.

Send for further details—

RUBERT M. GAY

Division, Universal Road Machinery Company

114 Liberty St. New York, N. Y.



Crushing, Screening, Washing

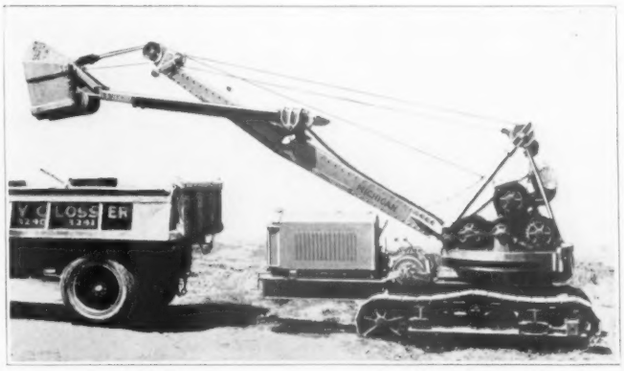
equipment—Reliance—in capacities from 50 to 1500 tons per day. Built with simplicity of design for long hard service with low maintenance costs. Send for catalog and full information.

Universal Road Machinery Co.

Kingston, N. Y.

FULL CIRCLE LOADING

This shows the Michigan Power Shovel loading directly over the power unit—providing a complete working radius that gives maximum operating efficiency.



ON job after job, it is the same story—the Michigan Crawler is forging ahead to new shoveling records in speed, yardage and low costs.

With *full circle loading, three-quarter digging and no tail swing,* it operates at top efficiency in close quarters where larger shovels would be handicapped for working space.

Finger-tip control is a feature that puts the Michigan in a class by itself for flexibility and ease of operation, especially in rough, uneven ground where instant "trigger action" is necessary.

The Michigan Shovel is ready for any job, as it is easily and quickly converted into a dipper, crane, dragline or clamshell type shovel simply by changing booms.

Write today for further details of the Michigan—it is the ideal size shovel for profitable operation on the average job.

If you are interested in crawler type shovels, ask for Michigan Power Shovel Bulletin.

FULL CIRCLE — THREE QUARTER DIGGING — NO TAIL SWING — LOADING

If you are interested in tire mounted shovels, ask for Michigan Truck Shovel Bulletin.

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 68

Rock Drills (See Drills—Rock)

Rod Mills
*Kennedy-Van Saun Mfg. and Eng. Corp.

Rope (Wire) (See Wire Rope)

Safety Equipment
Pulmosan Safety Equipment Corp.

Rust Protection
Self-Vulcanizing Rubber Co.

Sand Separators
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works

Sand-Settling Tanks
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works

Scrapers (Power Drag)
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.

Screens
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Buffalo Wire Works Co.
Chicago Perforating Co.
*Deister Concentrator Co.
Deister Machine Co.
Diamond Iron Works
*Eagle Iron Works
Gay, Rubert M.
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
Pioneer Gravel Equipment Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.
Universal Road Machy. Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Buffalo Wire Works Co.
*Deister Concentrator Co.
Deister Machine Co.
Diamond Iron Works
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Separators (Air) (See Air Separators)

Sheaves
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Shovels (Electric, Internal Combustion and Steam)
*Link-Belt Co.
Michigan Power Shovel Co.
Ohio Power Shovel Co.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Speed Reduction Units
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Steel Grating (See Grating, Steel)

Steel Inclines (See Inclines, Steel)

Steel Plate Construction
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Sprout, Waldron & Co.

Storage Equipment
*Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tanks
*Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.
*Link-Belt Co.

Tanks (Sand-Settling)
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works

Tires (Truck)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Truck Equipment
Pettibone Mulliken Co.

Tractors
*Allis-Chalmers Mfg. Co.

Trailers
General Motors Truck Co.

Tramways (Aerial)
*American Steel & Wire Co.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Bartlett & Snow Co., C. O.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.

Unloaders (Box Car)
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
*Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Diamond Iron Works
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
*Tyler Co., W. S.
Universal Road Machy. Co.

Welding Supplies
*American Steel & Wire Co.

Well Drills (See Drills—Well)

Wheels (Car)
*Eagle Iron Works
Iowa Mfg. Co.
Pettibone Mulliken Co.

Winches and Capstans
*Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Wire & Cable (Electric)
*American Steel & Wire Co.

Wire Cloth
Buffalo Wire Works Co.
Ludlow-Saylor Co.
National Wire Cloth Co.
*Tyler Co., W. S.

Wire Rope
American Cable Co.
*American Steel & Wire Co.
Buffalo Wire Works Co.
Williamsport Wire Rope Co.

Wire-Rope Fittings
American Cable Co.
*American Steel & Wire Co.
Buffalo Wire Works Co.
Williamsport Wire Rope Co.

Wire Rope Slings
American Cable Co.
*American Steel & Wire Co.
Williamsport Wire Rope Co.

Wire (Welding)
*American Steel & Wire Co.

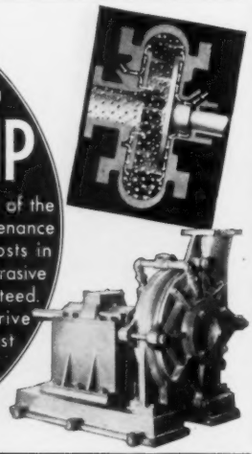
Worm Gears (See Gears and Pinions)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

HYDROSEAL DREDGE PUMP

Unique principle of hydrosealing both sides of the impeller against abrasive wear, cuts maintenance to a fraction and saves ⅓ in power costs in pumping sand, gravel, rock and other abrasive materials—Estimated economies guaranteed. Sizes 2" to 22", pulley or motor drive. Descriptive Catalog sent on request.

ALLEN-SHERMAN-HOFF CO.
223 South Fifteenth Street
Philadelphia, Pa.



HENDRICK PERFORATED METALS

are popular in the quarry fields. They wear well. Full range of sizes

Heat-Treated Double-Corrugated Plates

with square, round and "Sqround" perforations. Write for data, particularly on the new "Sqround" Mesh.

Investigate the Weston Testing Screen for making sizing tests.

HENDRICK MANUFACTURING CO. Carbondale, Pa.

Baltimore Birmingham Boston Cincinnati Cleveland Detroit Hazleton New York Philadelphia Pittsburgh

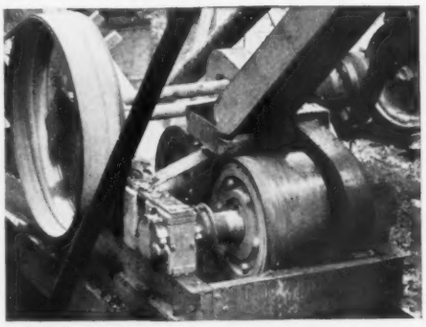
INCREASE YOUR PROFITS

The production of aggregates with speed and in large quantities means low cost and increased profits.

Whether stationary or portable equipment is required on your contract there is a Universal combination that has back of it a performance record that guarantees quality materials for less money, hence greater profit.

Relief programs everywhere have found Universal equipment to be an important factor in getting greater returns on the money invested. Big variety makes the selection of the right outfit an easy matter.

A modern portable gravel plant for government, state, county, municipality or contractor. We serve them all.



A Universal Roll Crusher in a portable or stationary plant insures greater capacity of fine materials at low cost.

If it's a rush job, Universal reliability will insure its completion on time.

If it's a long tough job, Universal durability and lasting dependability are a guarantee of uninterrupted operation.

If it's one of many roadside jobs, Universal portability means easy, cheap moving, quick setup and production "right now."

These features with many more have meant increased popularity for Universal Crushers and equipment.

Let us help you with your problem.

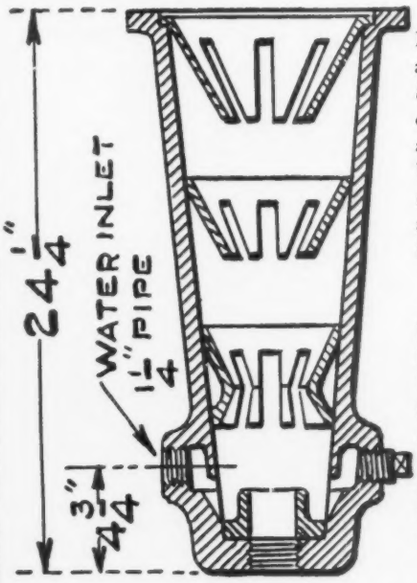
A Complete Catalog Sent on Request

UNIVERSAL CRUSHER COMPANY

619-C Avenue West **Cedar Rapids, Iowa**

NEW COMPOUND FUNNEL CLASSIFIER

WRITE FOR BULLETIN NO. 23, FULL DETAILS



Is especially adapted for *grading* and *blending* of sands to meet any specifications. Will effectively remove silt, slime, and other light impurities.

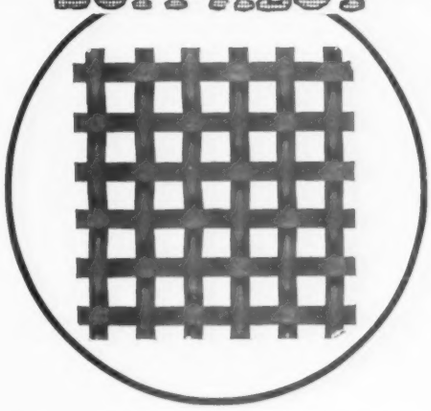
* * *

Improved, Heavy Duty, PLAT-O VIBRATING SCREEN, for accurate sizing and heavy tonnages, is described in Bulletin No. 22. Write for copy.

DEISTER MACHINE COMPANY

1933 EAST WAYNE ST. FT. WAYNE, IND.

BUFF-ALOY



The latest development in "Abrasion Resistant" Wire Screens.

Cuts down replacement costs—One trial will make you a steady user—"BUFF-ALOY" Bulletin No. 101-B sent upon request.

NRA MEMBER U.S. WE DO OUR PART

BUFFALO WIRE WORKS COMPANY

INCORPORATED

(Formerly Scheeler's Sons, Est. 1869)

526 Terrace **Buffalo, N. Y.**

Philadelphia Branch:

11 S. 7th St., Philadelphia, Pa.

LINK-BELT VIBRATING SCREEN

Built To Meet Today's Needs

Made in three general types for both fine and coarse screening. Send for Book No. 1462.

5111

LINK-BELT COMPANY

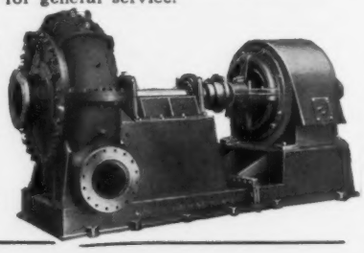
PHILADELPHIA CHICAGO INDIANAPOLIS
SAN FRANCISCO Offices in Principal Cities TORONTO

NRA MEMBER U.S. WE DO OUR PART

MORRIS CENTRIFUGAL PUMPS

For hydraulic dredging, filling, sand and gravel production; hydraulic conveying of slurry and other liquids containing abrasive materials; clear water pumps for general service.

Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and for belt, motor, steam, oil or gasoline-engine drive.



Write for Bulletins

Morris Machine Works
Baldwinsville, N. Y.
Export Office: 30 Church St., New York.

Complete Quarry and Gravel Plant EQUIPMENT

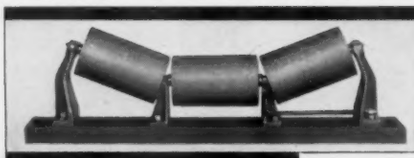
From Crushers to Bin Gates

Write today for Bulletin 266

Smith Engineering Works, 504 E. Capitol Drive, Milwaukee, Wis.

TELSMITH

BELT CONVEYOR IDLERS



CRUSHERS
ROTARY SCREENS
DRYERS
SKIP HOISTS
ELEVATORS
CONVEYORS

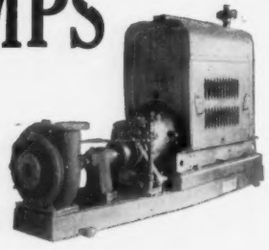
● Equipped with Timken bearings and factory tested so that they are ready for immediate field service, B & S belt conveyor idlers give maximum performance. . . . They are easily lubricated. Standard sizes of flat and troughed design carried in stock for your convenience. Full details on request.

THE C. O. BARTLETT & SNOW CO.
6194 HARVARD AVENUE • CLEVELAND, OHIO

ERIE PUMPS

SINCE 1889

Built in sizes from 4″ to 18″ discharge; 14 to 300 cu.yd. capacity; heads to 125 ft.



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ERIE PUMP & ENGINE WORKS
153 GLENWOOD AVE. MEDINA, N. Y.

LEADERS SINCE 1835

CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

SUPER DRY PANS—For especially large tonnages.

WASHERS AND SCRUBBERS—Steel log Washers; scrubbers, cylinder washers, sand drags and washing screens.

DRYERS—Revolving cylindrical, of various sizes.

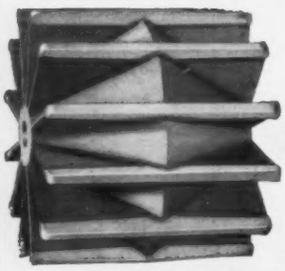
JIGS—For concentrating and beneficiating hematite and manganese ores.

SCREENS—Cylindrical and conical screens of any size and capacity.

HOISTS, ELEVATORS AND CONVEYORS—Electric, friction and gravity hoists, steel conveyors of different sizes and capacities.

McLanahan & Stone Corp.
Hollidaysburg, Pa.

SAVE YOUR CONVEYOR and Elevator Belts *with* SPROUT-WALDRON Wing Pulleys



Interchangeable with standard pulleys. Nothing can lodge between belt and pulley.

SPROUT, WALDRON & CO. INC.
1221 SHERMAN ST., MUNCY, PA.
Elevating, Conveying and Transmission Equipment

Lewistown Foundry Products ARE

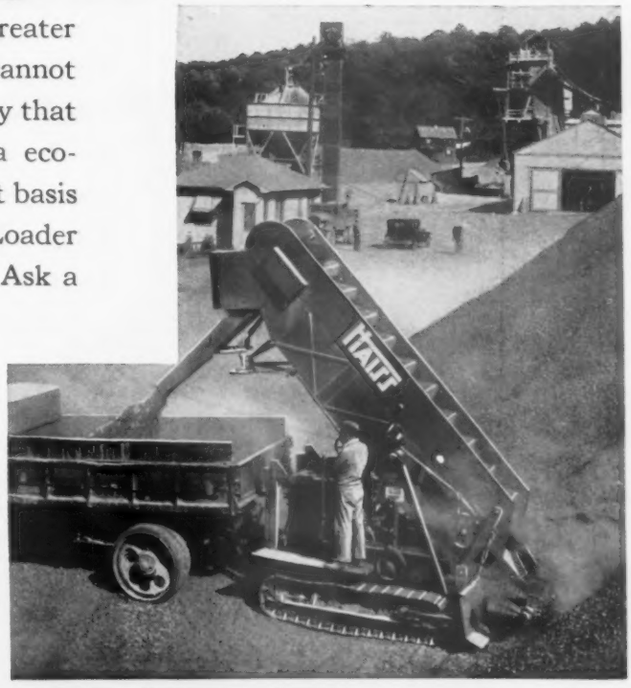
Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

Lowest Cost per Cu. Yard

There never was a time when quality was of greater importance in your choice of equipment. You cannot afford to waste dollars. You must have machinery that will pay for itself in extra work capacity, extra economical operation and slow depreciation. On that basis you cannot afford anything less than a Haiss Loader . . . You know of its mechanical superiority. Ask a user about its low upkeep.



Write for catalog and 1934 prices on the model that fits your need.

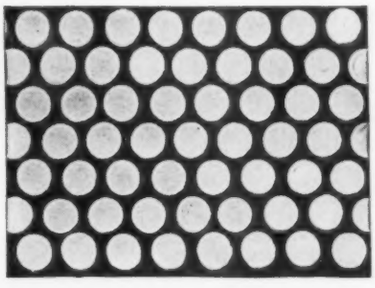
George Haiss Manufacturing Co., Inc.
142nd St. & Rider Ave., New York

MODEL "135" 5 yds. per min.
MODEL "80" 3 yds. per min.
MODEL "27" 2 yds. per min.
MODEL "50" 1½yds. per min.

HAISS "Path Digging" LOADERS

ALSO: CLAMSHELL BUCKETS . . HOPPER GATES . . SCREENS . . ELEVATORS . . CONVEYORS & PARTS.

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

The Morrow Manufacturing Co.
Wellston, Ohio

AMERICAN *ROLLING RING* CRUSHER

New methods and new machines is the order of the day—and it is answered by the Rolling Ring principle of crushing—proven by performance.

LOW FIRST COST makes the American Crusher a prime investment. Easy to install, dismantle and move.

LOWER OPERATING COST because the American takes less power per ton of product. Flexible rotor assures protection from injury of tramp iron.

LOWER MAINTENANCE COST as the Rolling Rings wear many times longer than hammer surfaces.

Write today for facts on why the American Rolling Ring Crusher gives a more uniform product, with minimum fines and no slivers or chips.

American Pulverizer Company
1289 Macklind Ave., Dept. P.Q. St. Louis, Mo.

Designed to combat Severest Dusts!

The New **PULMOSAN DUST RESPIRATOR** *"M Type"*

PULMOSAN
the only respirator with all-aluminum body.
Holds shape—light weight—wears longer

The new, improved Pulmosan "M" type respirators are the result of special study and long experience in overcoming dusts. The "M" respirators are being used in increased numbers by leading mines, quarries and plants to combat severe dust conditions. Workers like the unusual wearing comfort—easy breathing and dependable safety. Test an "M" respirator in your own plant. Make comparisons. Write for bulletin No. 2, for full details.

NRA MEMBER U.S. WE DO OUR PART

PULMOSAN SAFETY EQUIPMENT CORP.
176 Johnson St., Brooklyn, N. Y.

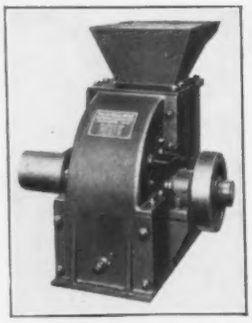
GRUENDLER FORTY-NINER

New Balanced Portable Crushing Plant. Especially designed for Road Side Operation. Quarry, Gravel Pit Owners and Contractors are finding this new addition a real Profit Maker. Crusher, Power Units and Folding Elevator on 4-Wheel Steel Frame, Steel Jack Leg Bin and Screen, so as to give you combination crushing and screening either in gravel or stone operations.

Large or Small Jobs Handled easily by these units from 200 to 1,000 tons daily capacity.

Write GRUENDLER now

GRUENDLER CRUSHER & PULVERIZER COMPANY
2915 North Market St., Dept. PQ.
ST. LOUIS, MO.



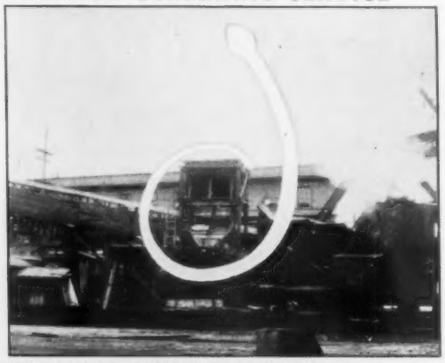
Pulverators

The Allis-Chalmers Pulverator is an impact crusher used for pulverizing friable non-siliceous materials. It is built in four sizes with from 4 to 24 hammers. Write for Bulletin 1467.

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS.

GUARANTEED SCREENING SERVICE

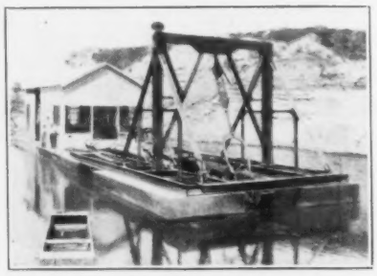
LEAHY



THE DEISTER CONCENTRATOR CO.
911 Glasgow Ave. Incorporated 1906 Ft. Wayne, Ind.
New York Office, 104 Pearl St., New York

Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.
MATERIAL IN STOCK
PROMPT SHIPMENT
CHICAGO PERFORATING CO.
2435 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

EAGLE SWINTEK SCREEN NOZZLE LADDER LOWER YOUR COST



Will eliminate stoppages and slug pumping — insuring an even, constant feed of solids to the suction nozzle — with less power—greatly decreasing the cost per yard of material produced.

Write for descriptive literature and let us tell you how this can be done with your dredge.

Eagle Iron Works
Des Moines, Iowa

GREGORY HI-GRADE-REBUILT

We
- Sell
- Buy
- Rent
- Repair
- Exchange
- All Makes
- and Sizes

Electric Motor Driven Pumps, Air Compressors, Big Bargains. All Standard Makes Motors.

Always Dependable Economical

Money-Back Guarantee

GREGORY ELEC. CO.
1603 S. Lincoln St., Chicago

CONSOLIDATED

GOOD USED CRUSHING, QUARRY and CONTRACTOR'S EQUIPMENT FOR SALE

SEND US YOUR INQUIRIES FOR

Complete Crushing Plants; Diesel, Gasoline, Electric Cranes and Shovels; Hoists; Compressors; Pumps; Dragline and Excavating Equipment; and all sizes and types of Jaw, Gyratory and Roll Crushers; Swing Hammer Mills; Elevators; Belt Conveyors; Rotary and Vibrating Screens; Rotary Kilns and Dryers; Raymond and other fine Pulverizers; Air Separators; Hardinge Ball and Pebble Mills; Silex and iron lined Tube Mills, etc.

Send for Bulletin No. 15.

CONSOLIDATED PRODUCTS COMPANY, INC.

17-19 PARK ROW
NEW YORK CITY

Shops and Yards at
Newark, N. J., cover six acres

Tel. Barclay 7-0600
WE WILL BUY YOUR SURPLUS MACHINERY

MOTORS—
3 PH., 60 CY.

Hp.	Type	Speed
800	G. E. sl. rg.	720
600	G. E. syn.	860
2–600	G. E. sl. rg.	252
600	G. E. syn.	257
600	Al. Ch. syn.	240
3–675	Al. Ch. syn.	900
400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	720
200	G. E. sl. rg.	1200
200	West. sl. rg.	500
200	F. M. sl. rg.	600
150	G. E. sl. rg.	1750
150	G. E. sq. c.	1750
100	Cr. Wh. syn.	225

ENGINE GENER.
1–400 kva., Cr. Wh., 240 v., 3 ph., 60 cy., 120 r.p.m. to Hamilton Corliss Engine.

MOTOR GENER.
1–750 kw. G. E. MPC., 250 v., D.C. Gener. to 1100 hp. G. E., ATI, synch. motor, 2200-3-60-900 r.p.m.

CENTRIF. PUMPS
3–14,000 G.P.M., 150′ Head dir. conn., 675 hp. Al. Ch. 900 r.p.m. syn. motors.
1–14,000 G.P.M., 60′ Hd., dir. conn. 260 hp., Al. Ch. 720 r.p.m.

Above are a few of our stock items.

BELYEA CO., INC.
153 W. 18TH ST., NEW YORK CITY
REBUILT GUARANTEED

FOR SALE

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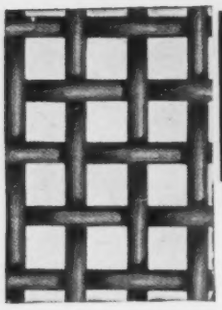

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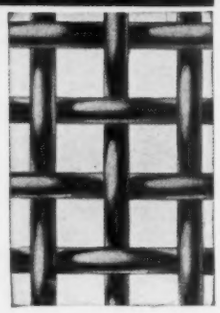

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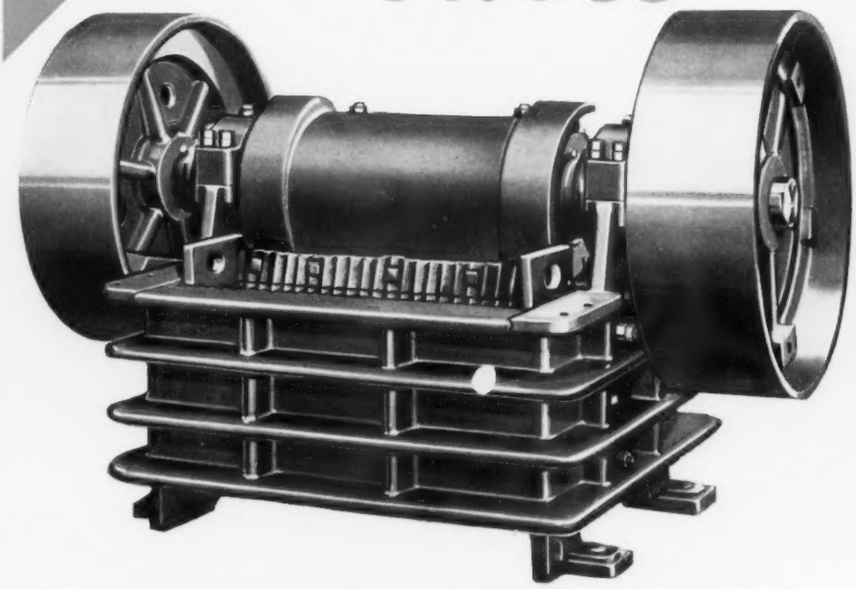

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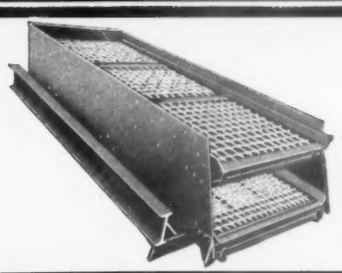
"The Perfect" SUPER-LOY

WOVEN WIRE SCREENS



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